CIRCUIT BOARD INDICATORS

CONSIDER IT DONE

Dialight

A Roxboro Group Company

Dialight

Leadership in optical indication

In the world of optical indication, no company has a richer history of light source technology, product innovation, and dedication to customer needs than Dialight. We introduced the world to panel mount and circuit board indicators, and today we are the leading manufacturer of indicator products including unique surface-mount types, for every type of application.

In addition to our U.S., European and Asian sales offices, Dialight serves more than 30,000 customers with an extensive worldwide distribution network. From applications in computer, telecommunications, transportation, and medical equipment, no other company has delivered as many value-added indicator solutions as Dialight.

Our continuing success comes from a commitment to total customer satisfaction. We have developed an environment that inspires teamwork and continuous improvement, and incorporates state-of-the-art manufacturing. We have also instituted a company-wide Six Sigma Quality Program, and achieved ISO 9001 certification as well.

Dialight reserves the right to make changes at any time in order to supply the best product possible.

Custom Solutions...Fast

In addition to the products you'll find in this Data Book, Dialight creates custom LED solutions. When you have special requirements, we'll assemble a Dialight Custom Product Team to help you develop the best solution. Our CAD design, prototyping, tool design, toolmaking, and assembly capabilities, all in-house and integrated, help our customers minimize their time to market for new products.

There's simply no faster, easier, more cost-effective way to produce a custom indicator solution.

Using The Data Book

Each product section of this book is preceded by a **"Selector Guide"** to assist in locating the product of interest.

Please also note that each data sheet in this book, whether it pertains to a circuit board, a light pipe, or a discrete LED, contains some basic operating characteristics for the LED integrated into or associated with the given product. There will also be reference to an "**LED Data Sheet**," which provides more detailed LED specifications, and can be found in the back of each product section. Each data sheet also provides some of the key benefits of the product, part numbers, and in some cases, a brief application note.

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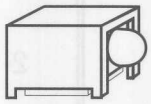
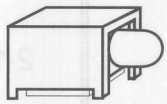
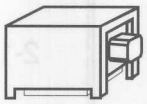
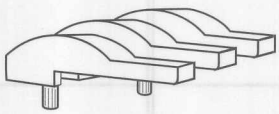
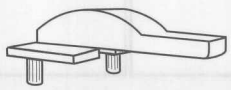
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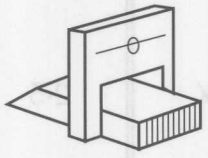
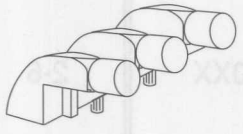
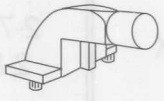
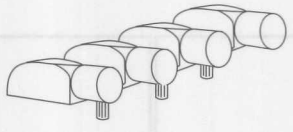
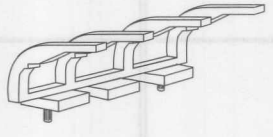
Selector Guide:

Surface Mount LED Products & Light Pipes

	DESCRIPTION	DATA SHEET	PAGE(s)
	2mm Prism® Series SMD CBI	595-2X01-0XX	2-5
	3mm Prism Series SMD CBI (591-XX01-1XX recomended for new designs)	591-2X01-0XX	2-6
	3mm Prism Series SMD CBI	591-XX01-1XX	2-7& 2-8
	Optopipe™ Light Pipe Array (MicroLED® SMT LEDs are used in conjunction with this light pipe)	515-1000	2-9
	Optopipe Light Pipe (MicroLED SMT LEDs are used in conjunction with this light pipe)	515-1001	2-10

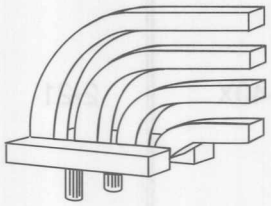
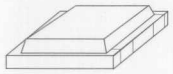
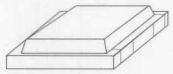
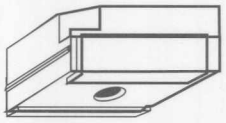
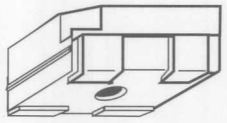
Selector Guide:

Surface Mount LED Products & Light Pipes

	DESCRIPTION	DATA SHEET	PAGE(s)
	Optopipe™ Light Pipe (MicroLED® SMT LEDs are used in conjunction with this light pipe)	515-1004	2-11
	Optopipe Light Pipe Array (MicroLED SMT LEDs are used in conjunction with this light pipe)	515-1010	2-12
	Optopipe Light Pipe (MicroLED SMT LEDs are used in conjunction with this light pipe)	515-1011	2-13
	Optopipe Light Pipe Array (MicroLED SMT LEDs are used in conjunction with this light pipe)	515-1020	2-14
	Optopipe Light Pipe Array for RJ45 Jack Applications (MicroLED SMT LEDs are used in conjunction with this light pipe)	515-1022	2-15

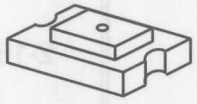
Selector Guide:

Surface Mount LED Products & Light Pipes

	DESCRIPTION	DATA SHEET	PAGE(s)
	Optopipe™ Light Pipe (Quad-Level) (MicroLED® SMT LEDs are used in conjunction with this light pipe)	515-1023	2-16
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	Bicolor MicroLED SMT LED	597-77X1-10X	2-18
	MicroLED SMT LED	597-3XX1-20X	2-19
	Bicolor MicroLED SMT LED	597-7701-20X	2-20

Selector Guide:

Surface Mount LED Products & Light Pipes

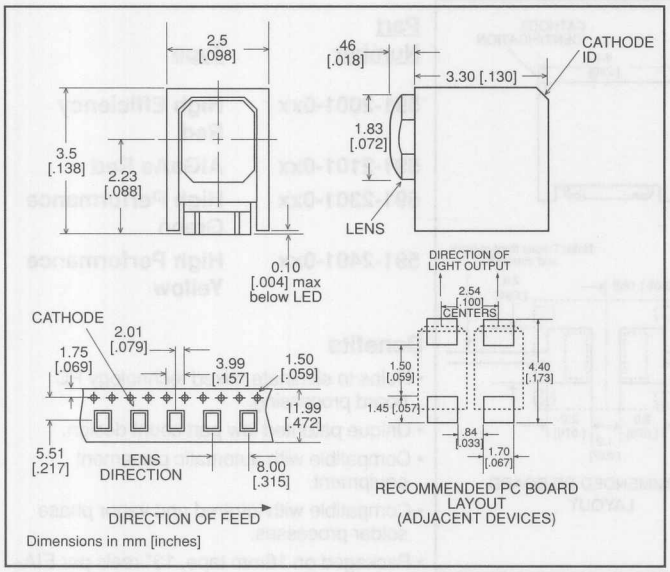
	DESCRIPTION	DATA SHEET	PAGE(s)
	MicroLED® SMT LED	597-3XX1-40X	2-21

2mm Prism® CBI® Circuit Board Indicator Surface Mount LED

Dialight

595-2x01-0xx

2



U.S. Patent RE 34,254; foreign patents pending

Part Number*	Type
595-2101-0xx	AlGaAs Red
595-2301-0xx	High Performance Green
595-2401-0xx	High Performance Yellow

Benefits

- Helps to eliminate mixed technology PC boards.
- Unique patented low part count design.
- Compatible with automatic placement equipment.
- Compatible with infrared and vapor phase solder processes.
- Packaged on 12mm tape, 7" or 13" reels per EIA-481-1.
- Black case enhances contrast ratio.
- 2 mm LED size saves space, allows .100" spacing.
- Housing and lens material meets UL94V-0 flammability rating.
- Uses LEDs designed specifically for surface mounting.

*** ORDERING INFORMATION**

595-2101-XXX

packaging option

-002	20 pieces on tape
-007	7" reel, 600 pcs/reel
-013	13" reel, 2300 pcs/reel

Operating Characteristics at T_A = 25°C

Parameter	Part No.	Min	Typ	Max	Units	Test Cond.
Forward Voltage V_F	-2101		1.7	2.0	V	20 mA
	-2301		2.1	2.5		
	-2401		2.2	2.5		
Reverse Voltage V_R	All	4			V	I_R = 100 µA
Dominant Wavelength λ Dom	-2101		640		nm	
	-2301		567			
	-2401		588			
Luminous Intensity I_V	-2101		25		mcd	I_F = 20 mA
	-2301		11			
	-2401		9			
Viewing Angle	All		±20		deg.	20 mA

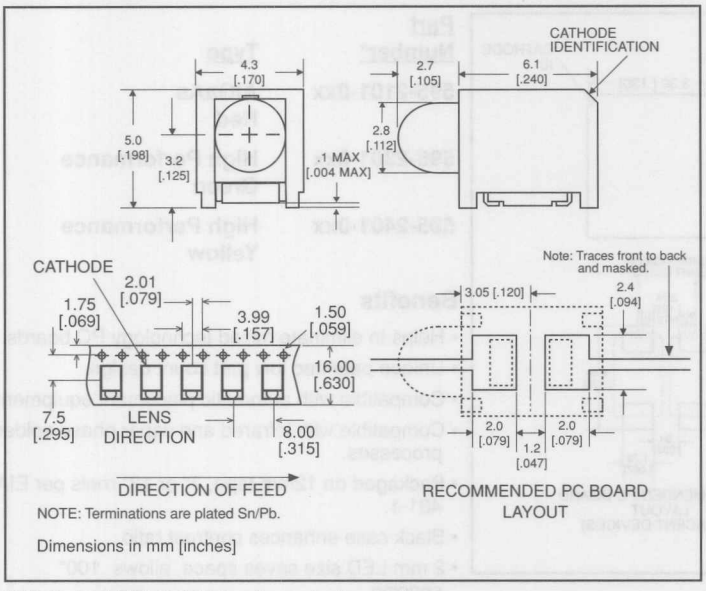
Absolute Maximum Ratings, T_A=25°C

Parameter	-2101	-2301 and -2401
Power Dissipation	60 mW	100mW
Forward DC Current (derate linearly from 25°C at .42mA°C)	30 mA	
Peak Forward Current (10µsec)	70 mA	
Operating Temperature	-30°C to +85°C	
Storage Temperature	-30°C to +85°C	
Soldering Temperatures Convection IR Vapor Phase	260° Peak, above 120° for 2 min., 215°C for 3 Min.	

3mm
Prism® CBI®Circuit Board Indicator
Surface Mount LED, Round Lens

Dialight

591-2x01-0xx



NOTE: Terminations are plated Sn/Pb.

Dimensions in mm [inches]

U.S. Patent RE 34,254; foreign patents pending.

Part Number	Type
591-2001-0xx	High Efficiency Red
591-2101-0xx	AlGaAs Red
591-2301-0xx	High Performance Green
591-2401-0xx	High Performance Yellow

Benefits

- Helps to eliminate mixed technology PC board processing.
- Unique patented low part count design.
- Compatible with automatic placement equipment.
- Compatible with infrared and vapor phase solder processes.
- Packaged on 16mm tape, 13" reels per EIA-481-2.
- Black case enhances contrast ratio.
- Housing and lens material meets UL94V-0 flammability rating.
- Uses LEDs designed specifically for surface mounting.

Operating Characteristics at T_A = 25°C

Parameter	Part No.	Min	Typ	Max	Units	Test Cond.
Forward Voltage V_F	-2001		2.0	2.6	V	I_F = 10mA
	-2101		1.75	2.6		
	-2301		2.0	2.6		
	-2401		2.0	2.6		
Reverse Voltage V_R	-2001	5			V	I_R = 10 µA
	-2101	3				
	-2301	5				
	-2401	5				
Dominant Wavelength λ Dom	-2001		628		nm	
	-2101		645			
	-2301		570			
	-2401		590			
Luminous Intensity I_V	-2001		5		mcd	I_F = 10mA
	-2101		14			
	-2301		4			
	-2401		5			
Viewing Angle	All		±20		deg.	

ORDERING INFORMATION

591-2101-0XX

packaging option

-002	20 pieces on tape
-013	13" reel, 1600 pcs/reel

Absolute Maximum Ratings, T_A=25°C

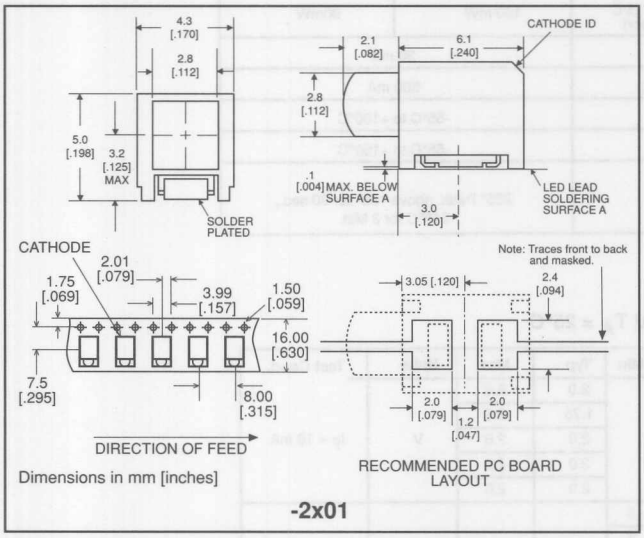
Parameter	All Types
Power Dissipation (derate linearly from 25°C at 1.3 mW/°C)	100 mW
Forward DC Current	30 mA
Peak Forward Current (10µsec)	500 mA
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
Soldering Temperatures Convection IR Vapor Phase	235° Peak, above 185° for 90 sec., 215°C for 3 Min.

3mm
Prism® CBI®Circuit Board Indicator
Surface Mount LED, Square Lens

Dialight

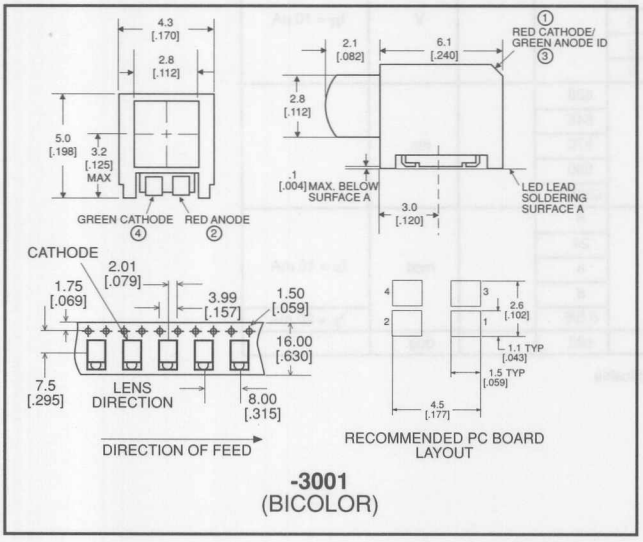
591-xx01-1xx

2



Dimensions in mm [inches]

-2x01



-3001
(BICOLOR)

Part Number*	Type
591-2001-1xx	High Efficiency Red
591-2101-1xx	AlGaAs Red
591-2301-1xx	Green
591-2401-1xx	Yellow
591-3001-1xx	Red/Green Bicolor

Benefits

- 3mm square lens provides large viewing area.
- Unique patented low part count design.
- Helps to eliminate mixed technology PC boards.
- Compatible with automatic placement equipment.
- Housing and lens material meets UL94V-0 flammability rating.
- Compatible with infrared and vapor phase solder processes.
- Black case enhances contrast ratio.
- Packaged on 16mm tape, 13" reels per EIA-481-2.
- Uses LEDs designed specifically for surface mounting.

U.S. Patent RE 34,254; foreign patents pending

*** ORDERING INFORMATION**

591-2101-1XX

packaging option

-102	20 pieces on tape
-113	13" reel, 1600 pcs/reel

Absolute Maximum Ratings, T_A=25°C

Parameter	-2x01	-3001
Power Dissipation (derate linearly from 25°C at 1.3 mW/°C, except 1.2 mW/°C for bicolor)	100 mW	90mW
Forward DC Current	30 mA	
Peak Forward Current (10µsec)	500 mA	
Operating Temperature	-55°C to +100°C	
Storage Temperature	-55°C to +100°C	
Soldering Temperatures Convection IR Vapor Phase	235° Peak, above 185° for 90 sec., 215°C for 3 Min.	

Operating Characteristics at T_A = 25°C

Parameter	Part No.	Min	Typ	Max	Units	Test Cond.
Forward Voltage V_F	-2001		2.0	2.6	V	I_F = 10 mA
	-2101		1.75	2.6		
	-2301		2.0	2.6		
	-2401		2.0	2.6		
	-3001		2.0	2.6		
Reverse Voltage V_R	-2001	5			V	I_R = 10 µA
	-2101	3				
	-2301	5				
	-2401	5				
	-3001	5				
Dominant Wavelength λ Dom	-2001		628		nm	
	-2101		645			
	-2301		570			
	-2401		590			
	-3001		628/570			
Luminous Intensity I_V	-2001		8		mcd	I_F = 10 mA
	-2101		24			
	-2301		8			
	-2401		8			
	-3001		6.5/8			I_F = 20 mA
Viewing Angle	All		±20		deg.	

NOTE: -3001 data Red/Green where applicable

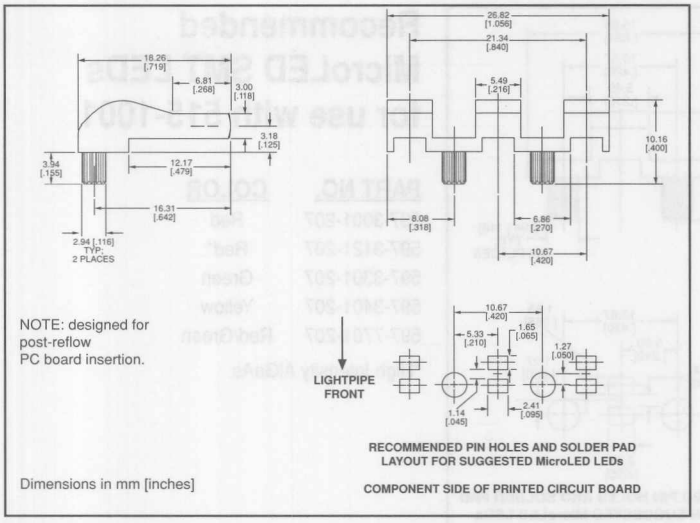
Dialight

3 x 5.5mm Rectangular microLED® Optopipe™ Optical Light Pipe, 3 Array

Dialight

515-1000

2



Recommended MicroLED SMT LEDs for use with 515-1000

PART NO.	COLOR
597-3001-207	Red
597-3121-207	Red*
597-3301-207	Green
597-3401-207	Yellow
597-7701-207	Red/Green

*High Intensity AlGaAs

Benefits

- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Arrays reduce insertion costs
- Designed to replace rectangular right angle through-hole device
- Compatible with 515-1001 single position light pipe

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

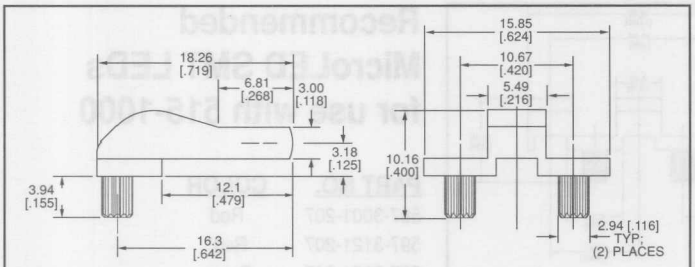
Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

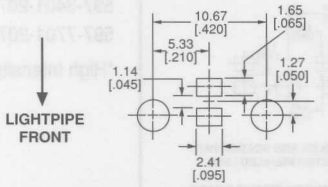
3 x 5.5mm Rectangular microLED® Optopipe™ Optical Light Pipe

Dialight

515-1001



NOTE: designed for post-reflow PC board insertion.



Dimensions in mm [inches]

RECOMMENDED PIN HOLES AND SOLDER PAD LAYOUT FOR SUGGESTED MicroLED LEDs

COMPONENT SIDE OF PRINTED CIRCUIT BOARD

Recommended MicroLED SMT LEDs for use with 515-1001

PART NO.	COLOR
597-3001-207	Red
597-3121-207	Red*
597-3301-207	Green
597-3401-207	Yellow
597-7701-207	Red/Green

*High Intensity AlGaAs

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Benefits

- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Compatible with 515-1000 3-array light pipe
- Sleek rectangular design

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

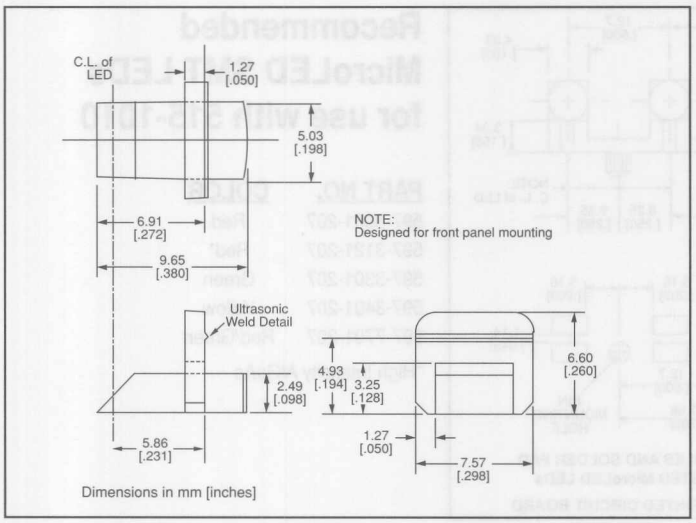
In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

2.5 x 5mm Rectangular microLED® Optopipe™ Optical Light Pipe

Dialight

515-1004

2



Recommended MicroLED SMT LEDs for use with 515-1004

PART NO.	COLOR
597-3111-407	Red
597-3311-407	Green
597-3401-407	Yellow

Benefits

- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Diffused lens
- Secures to front panel by ultrasonic welding

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is secured to the front panel by an ultrasonic welding process. The light is brought to the front panel once the product is assembled.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

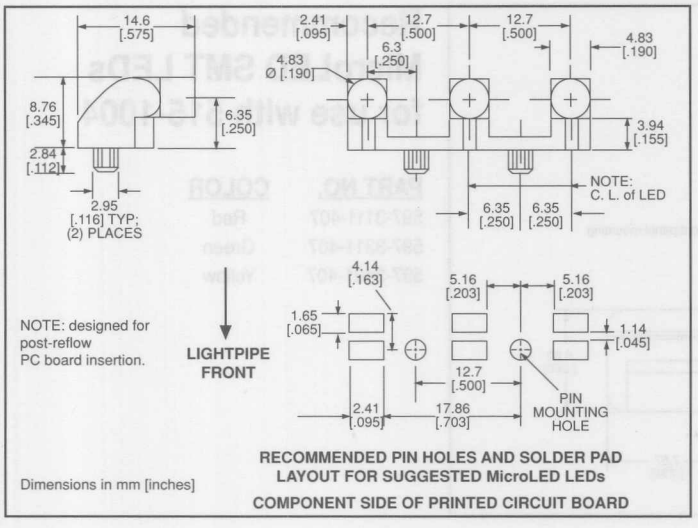
Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

5mm Round microLED® Optopipe™ Optical Light Pipe, 3 Array

Dialight

515-1010



Recommended MicroLED SMT LEDs for use with 515-1010

PART NO.	COLOR
597-3001-207	Red
597-3121-207	Red*
597-3301-207	Green
597-3401-207	Yellow
597-7701-207	Red/Green

*High Intensity AlGaAs

Benefits

- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Arrays reduce insertion costs
- Designed to replace 5mm right angle through-hole device
- Compatible with 515-1011 single position light pipe

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

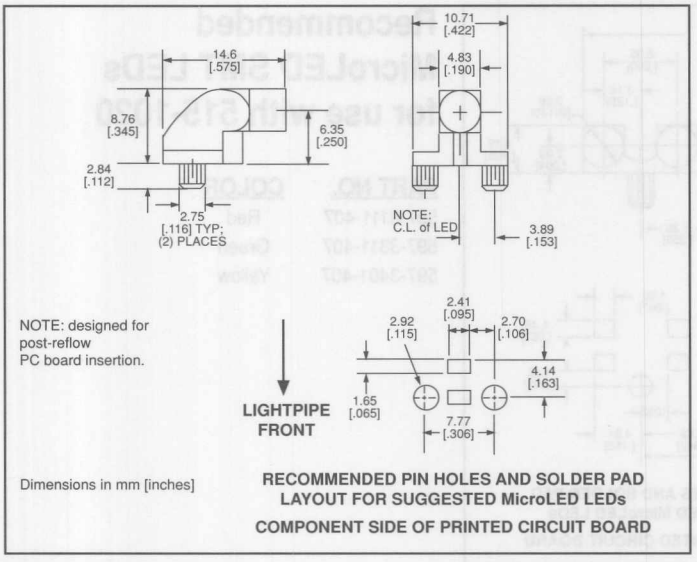
In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

5mm Round microLED® Optopipe™ Optical Light Pipe

Dialight

515-1011

2



Recommended MicroLED SMT LEDs for use with 515-1011

PART NO.	COLOR
597-3001-207	Red
597-3121-207	Red*
597-3301-207	Green
597-3401-207	Yellow
597-7701-207	Red/Green

*High Intensity AlGaAs

Benefits

- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Designed to replace 5mm right angle through-hole device
- Compatible with 515-1010 3-array light pipe

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

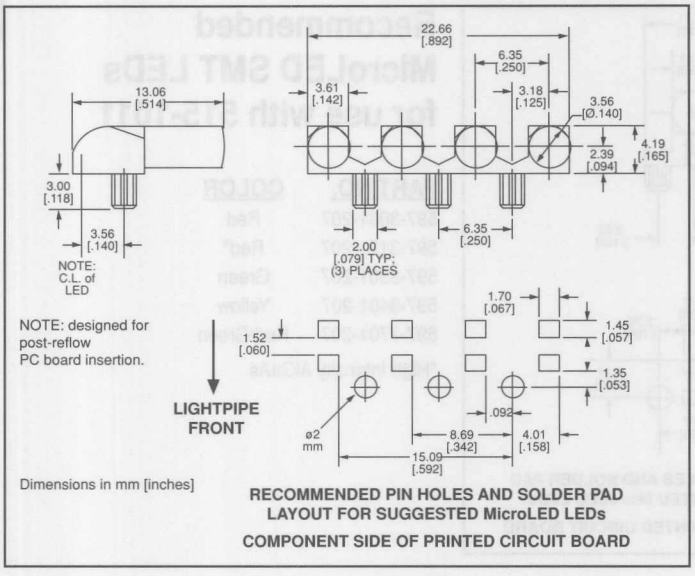
Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

3mm Round
microLED® Optopipe™
Optical Light Pipe, 4 Array

Dialight

515-1020



Recommended MicroLED SMT LEDs for use with 515-1020

PART NO.	COLOR
597-3111-407	Red
597-3311-407	Green
597-3401-407	Yellow

Benefits

- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Arrays reduce insertion costs

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

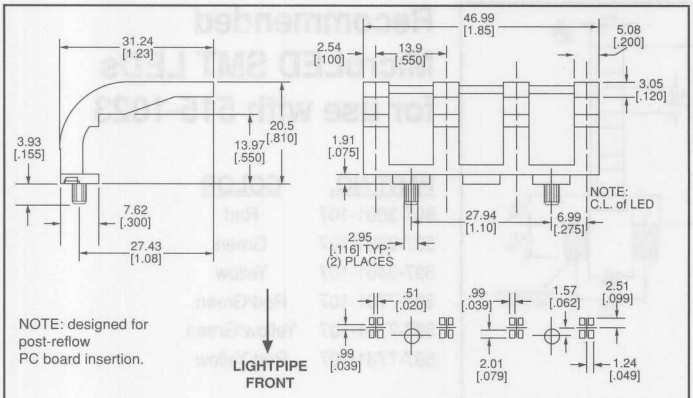
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In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

3 x 5mm Rectangular microLED® Optopipe™ Optical Light Pipe, 4 Array (RJ45 Jack)

Dialight

515-1022



RECOMMENDED PIN HOLES AND SOLDER PAD LAYOUT FOR SUGGESTED MicroLED LEDs

COMPONENT SIDE OF PRINTED CIRCUIT BOARD
Mounts over an RJ45 Jack

Dimensions in mm [inches]

Recommended MicroLED SMT LEDs for use with 515-1022

PART NO.	COLOR
597-3001-107	Red
597-3301-107	Green
597-3401-107	Yellow
597-7701-107	Red/Green
597-7721-107	Yellow/Green
597-7731-107	Red/Yellow

Benefits

- Allows indicators to be positioned above corresponding RJ45 jack
- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Arrays reduce insertion costs

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

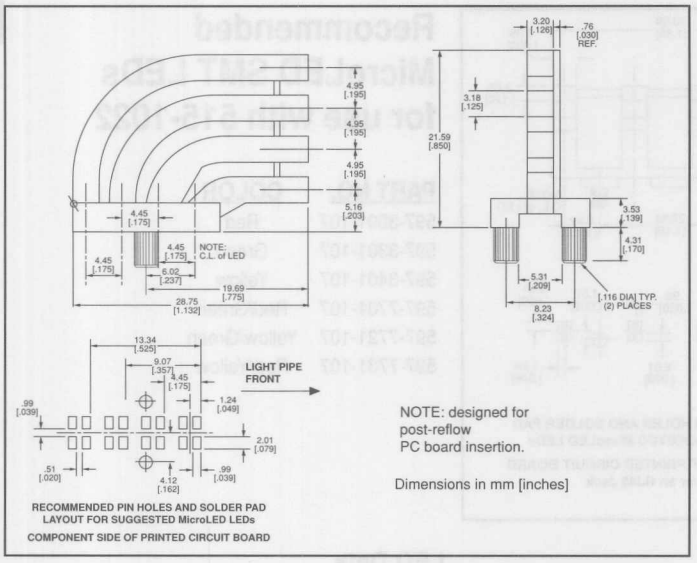
Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

3mm Square microLED® Optopipe™ Optical Light Pipe, Quad High

Dialight

515-1023



Recommended MicroLED SMT LEDs for use with 515-1023

PART NO.	COLOR
597-3001-107	Red
597-3301-107	Green
597-3401-107	Yellow
597-7701-107	Red/Green
597-7721-107	Yellow/Green
597-7731-107	Red/Yellow

Benefits

- High transmissivity polycarbonate material
- UL94V-0 compliance
- ESD protection (circuit isolation from front panel)
- Wide viewing angle
- Arrays reduce insertion costs
- Allows quad level SMT indicators

LED Data

For absolute maximum ratings and other electrical and optical data on the recommended LEDs, refer to LED data sheets.

Dialight Optopipe Light Pipe Applications

Light pipes are used in surface mount applications in which a discrete SMT LED is automatically placed on the PC board, and the emitted light needs to be displayed on the front panel of the equipment. The light pipe is inserted into the PC board following the surface mounting process, and transmits the light to the front panel.

Each light pipe is designed to transmit the light of a specific MicroLED LED, and its shape is defined by a CAD ray tracing program to optimize its light transmission efficiency. A well-designed light pipe will provide an optically efficient and aesthetically uniform solution.

Light pipes are required when (a) LEDs are located a distance from or are emitting light in a different direction from the front panel; (b) arrays (rows and/or columns) of SMT indicators are required on the front panel; (c) unique shapes for the indicators are needed; (d) additional protection against ESD (electrostatic discharge) is desired, as the LED is isolated by the polycarbonate light pipe material.

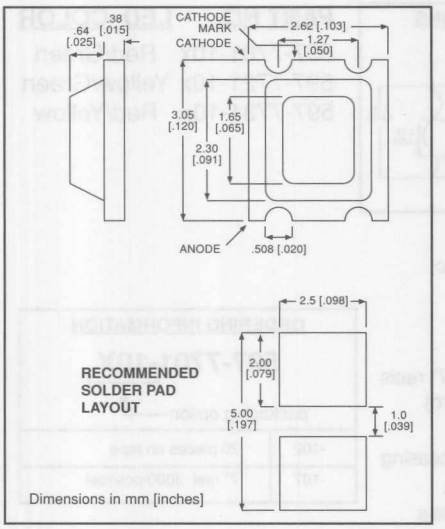
In addition to our range of standard products, Dialight can provide custom light pipe solutions for your applications. Contact your local representative for further information.

microLED® Surface Mount LED

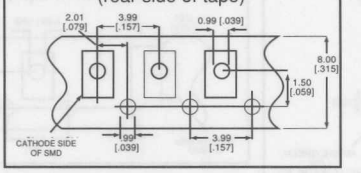
Dialight

597-3xx1-10x

2



TAPING SPECIFICATIONS
(rear side of tape)



PART NO.	LED COLOR
597-3001-10x	Red
597-3301-10x	Green
597-3401-10x	Yellow

Benefits

- Compatible with automatic placement equipment
- Compatible with infrared reflow processes
- Packaged on 8mm tape, 7" reels (meets EIA-481-1 standard)
- Helps to eliminate mixed technology PC board processing
- Compatible with Dialight's Optopipe™ Series light pipes

ORDERING INFORMATION

597-3001-10X

packaging option

-102	20 pieces on tape
-107	7" reel, 3000 pcs/reel

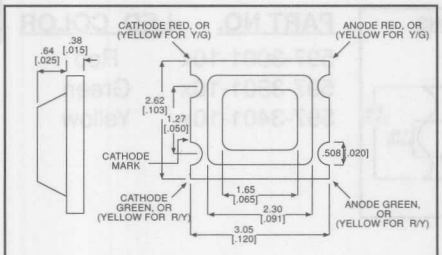
ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	**-3001**	**-3301**	**-3401**
Power dissipation (mW)	65	65	70
Forward Current (mA)	25	25	25
Derating (mA/°C)	.33	.33	.33
Peak Current (mA) *Pulse width = 1 µs*	100	100	100
Operating Temperature (°C)	-25/+75	-25/+75	-25/+75
Storage Temperature (°C)	-30/+75	-30/+85	-30/+85
Soldering Profile	*240°C to 260°C for 10 seconds*		

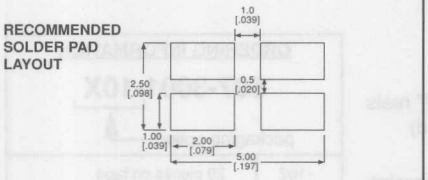
OPERATING CHARACTERISTICS (T_A=25°C)		**-3001**	**-3301**	**-3401**
Luminous intensity (mcd)	Min.	1.6	6.0	3.0
I_F=20mA	Typical	4.0	12	8.0
Peak Wavelength (nm) λ Peak	Typical	630	565	585
Viewing Angle	Typical	±85°	±85°	±85°
Forward Voltage (V)	Typical	2.0	2.0	2.1
I_F=20mA	Max.	2.6	2.6	2.8
Reverse Voltage (V), I_R=10µA	Min.	4	4	4

microLED® Surface Mount LED, Bicolor

Dialight

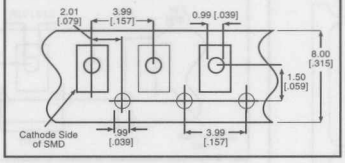
597-77x1-10x





Dimensions in mm [inches]

TAPING SPECIFICATIONS
(rear side of tape)



PART NO.	LED COLOR
597-7701-10x	Red/Green
597-7721-10x	Yellow/Green
597-7731-10x	Red/Yellow

Benefits

- Compatible with automatic placement equipment
- Compatible with infrared reflow processes
- Packaged on 8mm tape, 7" reels (meets EIA-481-1 standard)
- Helps to eliminate mixed technology PC board processing
- Compatible with Dialight's Optopipe™ Series light pipes

ORDERING INFORMATION

597-7701-10X

packaging option

-102	20 pieces on tape
-107	7" reel, 3000 pcs/reel

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-7701	-7721	-7731
Power dissipation (mW)	65/65[1]	70/65[2]	65/70[3]
Forward Current (mA)	25	25	25
Derating (mA/°C)	.33	.33	33
Peak Current (mA) *Pulse width = 1 µs*	100	100	100
Operating Temperature (°C)	-25/+75	-25/+75	-25/+75
Storage Temperature (°C)	-30/+85	-30/+85	-30/+85
Soldering Profile	240°C to 260°C for 10 seconds		

OPERATING CHARACTERISTICS (T_A=25°C)		-7701	-7721	-7731
Luminous intensity (mcd)	Min.	1.6/6.0[1]	3.0/6.0[2]	1.6/3.0[3]
I_F=20mA	Typical	4.0/12.0[1]	8.0/12[2]	4.0/8.0[3]
Peak Wavelength (nm) λ Peak	Typical	630/565	585/565	630/585
Viewing Angle	Typical	±85°	±85°	±85°
Forward Voltage (V)	Typical	2.0/2.0[1]	2.1/2.0[2]	2.0/2.1[3]
I_F=20mA	Max.	2.6/2.6[1]	2.8/2.6[2]	2.6/2.8[3]
Reverse Voltage (V), I_R=10µA	Min.	4	4	4

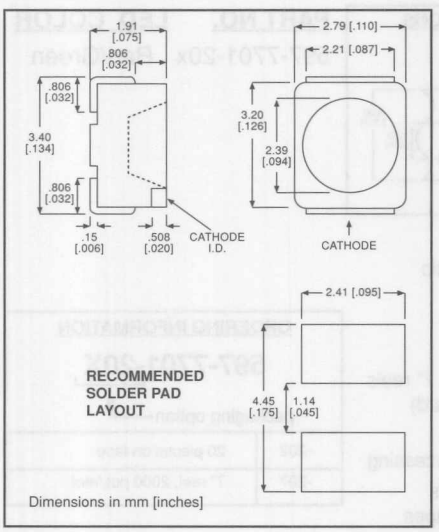
[1] Red/Green [2] Yellow/Green [3] Red/Yellow

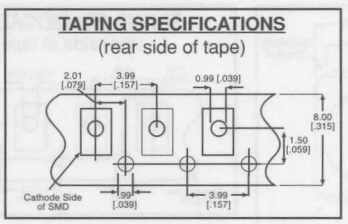
microLED® Surface Mount LED

Dialight

597-3xx1-20x

2





Benefits

- Compatible with automatic placement equipment
- Compatible with infrared reflow processes
- Packaged on 8mm tape, 7" reels (meets EIA-481-1 standard)
- Helps to eliminate mixed technology PC board processing
- Compatible with Dialight's Optopipe™ Series light pipes

PART NO.	LED COLOR
597-3001-20x	Red
597-3121-20x	Red*
597-3301-20x	Green
597-3401-20x	Yellow

*High Intensity AlGaAs

ORDERING INFORMATION

597-3001-20X

packaging option

-202	20 pieces on tape
-207	7" reel, 2000 pcs/reel

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-3001	-3121	-3301	-3401
Power dissipation (mW)	100	100	100	100
Forward Current (mA)	30	30	30	30
Derating (mA/°C)	.45[1]	.67[2]	.45[1]	.45[1]
Peak Current (mA) *Pulse width = 10 µs*	500	500	500	500
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100

Soldering Profile is 235°C peak 15 seconds, 185° for 90 seconds

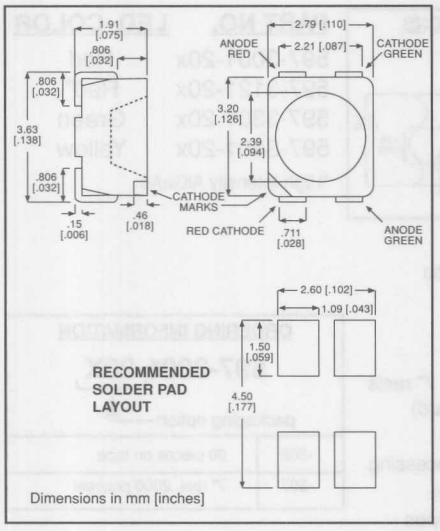
1. From 28°C 2. From 55°C

OPERATING CHARACTERISTICS (T_A=25°C)		-3001	-3121	-3301	-3401
Luminous intensity (mcd)	Min.	2.5	10	4.0	2.5
I_F=10mA	Typical	6.0	20	9.4	4.0
Peak Wavelength (nm) λ Peak	Typical	635	660	565	586
Viewing Angle	Typical	±60°	±60°	±60°	±60°
Forward Voltage (V)	Typical	2.0	1.75	2.0	2.0
I_F=10mA	Max.	2.6	2.6	2.6	2.6
Reverse Voltage (V), I_R=10µA	Min.	5	5	5	5

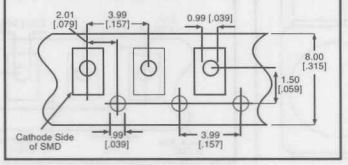
microLED® Surface Mount LED, Bicolor

Dialight

597-7701-20x



TAPING SPECIFICATIONS
(rear side of tape)



PART NO.	LED COLOR
597-7701-20x	Red/Green

Benefits

- Compatible with automatic placement equipment
- Compatible with infrared reflow processes
- Packaged on 8mm tape, 7" reels (meets EIA-481-1 standard)
- Helps to eliminate mixed technology PC board processing
- Compatible with Dialight's Optopipe™ Series light pipes

ORDERING INFORMATION

597-7701-20X

packaging option

-202	20 pieces on tape
-207	7" reel, 2000 pcs/reel

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)

	-7701
Power dissipation (mW)	90
Forward Current (mA) Derating (mA/°C)	30 .33[1]/.67[1]
Peak Current (mA) *Pulse width = 1 µs*	500
Operating Temperature (°C)	-55/+100
Storage Temperature (°C)	-55/+100
Soldering Profile	235°C peak 15 seconds, 185° for 90 seconds

1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)

		-7701
Luminous intensity (mcd) I_F=10mA	Min. Typical	2.5/4.0[1] 6.0/9.4[1]
Peak Wavelength (nm) λ Peak	Typical	635/565[1]
Viewing Angle	Typical	±60°
Forward Voltage (V) I_F=10mA	Typical Max.	2.0 2.6
Reverse Voltage (V), I_R=10µA	Min.	5

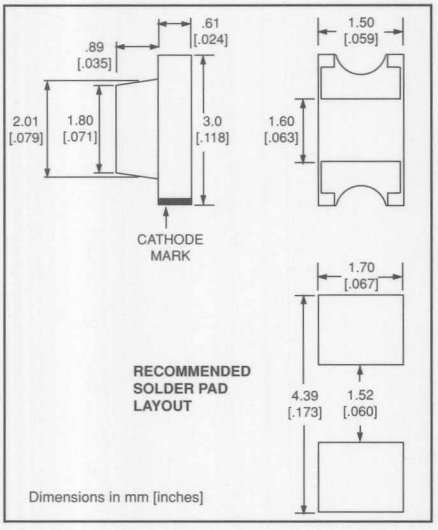
[1] Red/Green

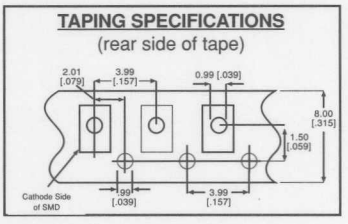
microLED® Surface Mount LED 1206 Type Package

Dialight

597-3xx1-40x

2





PART NO.	LED COLOR
597-3111-40x	Red*
597-3311-40x	Green
597-3401-40x	Yellow

*High Intensity AlGaAs

Benefits

- Compatible with automatic placement equipment
- Compatible with infrared reflow processes
- Packaged on 8mm tape, 7" reels (meets EIA-481-1 standard)
- Helps to eliminate mixed technology PC board processing
- Compatible with Dialight's Optopipe™ Series light pipes

ORDERING INFORMATION

597-3111-40X

packaging option

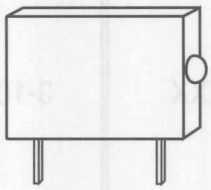
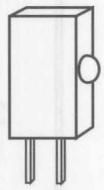
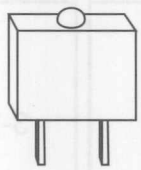
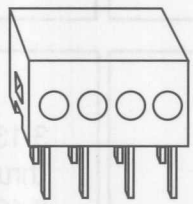
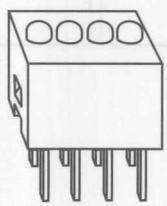
-402	20 pieces on tape
-407	7" reel, 2500 pcs/reel

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-3111	-3311	-3401
Power dissipation (mW)	60	75	75
Forward Current (mA) Derating (mA/°C)	30 .42	30 .42	30 .42
Peak Current (mA) *Pulse width = 1 µs*	70	70	70
Operating Temperature (°C)	-30/+85	-30/+85	-30/+85
Storage Temperature (°C)	-30/+90	-30/+90	-30/+90

Soldering Profile is 235°C for 15 seconds

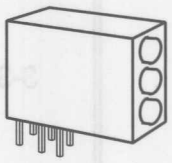
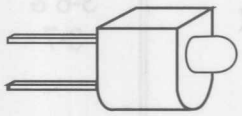
OPERATING CHARACTERISTICS (T_A=25°C)		-3111	-3311	-3401
Luminous intensity (mcd) I_F=20mA	Min. Typical	6.0 17	3.0 7.5	3.0 6.0
Peak Wavelength (nm) λ Peak	Typical	660	560	580
Viewing Angle	Typical	±35°	±35°	±35°
Forward Voltage (V) I_F=20mA	Typical Max.	1.7 2.0	2.1 2.5	2.2 2.5
Reverse Voltage (V), I_R=10µA	Min.	4	4	4

Selector Guide:
2mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	2mm LED CBI	547-2XXX	3-3
	2mm LED CBI	555-2XXX	3-4 & 3-5
	2mm LED CBI	555-3XXX	3-6 & 3-7
	2mm Quad LED CBI	555-4XXX	3-8
	■ Standard efficiency ■ Integral resistor (5V and other voltages)	555-5XXX	3-9

3

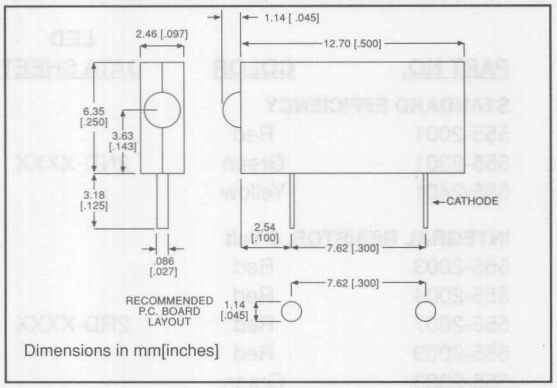
Selector Guide:
2mm LED Products

	TYPES OF LEDs	DATA SHEET	PAGE(s)
	2mm Tri-Level LED CBI (DIN 41494 compatible)	570-0100-XXX	3-10
	2mm LED (Standard efficiency, tinted, diffused)	521-9186 521-9195	3-11
	2mm LED (High efficiency, tinted, diffused)	521-9630 521-9631 521-9632	3-12
Backup 2mm LED Data Sheets for Reference Only			3-13 thru 3-15

2mm
LED CBI® Circuit Board Indicator
.300" Lead Spacing

Dialight

547-2xxx



Dimensions in mm[inches]

PART NO.	COLOR	LED DATA SHEET
Standard Efficiency		
547-2001	Red	2ND-XXXX
547-2301	Green	
547-2401	Yellow	
Integral Resistor, 5V		
547-2003	Red	2RD-XXXX
547-2007	Red	
547-2303	Green	
547-2403	Yellow	

3

Benefits

- Small 2mm design
- Available with a variety of LEDs
- Housing material meets UL94V-O
- Black case enhances contrast
- High reliability - life measured in years
- Housing assures proper LED Alignment
- Vibration and shock resistant

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

Typical Operating Characteristics @ T_A=25°C

Standard Efficiency

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
547-2001	Red	650	1.2	1.6	20	±20	2ND-xxxx
547-2301	Green	565	1.0	2.4	20	±20	
547-2401	Yellow	583	2.0	2.2	20	±20	

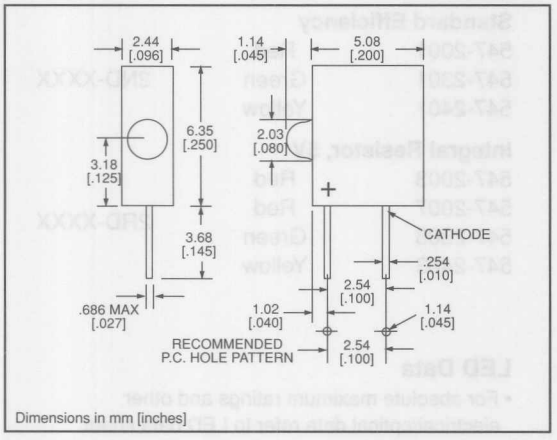
Integral Resistor, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
547-2003	Red	650	1.9	5	6.0	±20	2RD-XXXX
547-2007	Red	650	0.6	5	3.0	±20	
547-2303	Green	565	2.5	5	4.7	±20	
547-2403	Yellow	583	2.1	5	4.7	±20	

2mm
LED CBI® Circuit Board Indicator
Single

Dialight

555-2xxx



Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
555-2001	Red	
555-2301	Green	2ND-XXXX
555-2401	Yellow	
INTEGRAL RESISTOR, 5 Volt		
555-2003	Red	
555-2004	Red	
555-2007	Red	2RD-XXXX
555-2009	Red	
555-2303	Green	
555-2403	Yellow	
INTEGRAL RESISTOR, VARIOUS VOLTAGES		
555-2002	Red, 3.6V	
555-2005	Red, 10V	
555-2006	Red, 14V	2RD-XXXX
555-2008	Red, 24V	
555-2010	Red, 15V	

Benefits

- Small 2mm design conserves board space
- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- Vibration and shock resistant
- High reliability - life measured in years
- Compatible with Quad Block 555 Series

LED Data

- For absolute maximum ratings and other optical/electrical data refer to the LED Data Sheets

Typical Operating Characteristics @ T_A = 25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
555-2001	Red	650	1.2	1.6	20	±20	2ND-XXXX
555-2301	Green	565	1.0	2.4	20	±20	
555-2401	Yellow	583	2.0	2.2	20	±20	

INTEGRAL RESISTOR - 5V

Part Number	Color	Wavelength nm	I_V mcd	I_F mA	Test Voltage	Viewing Angle	LED Data sheet
555-2003	Red	650	1.9	6.0	5	±20	2RD-XXXX
555-2004	Red	650	5.2	17	5	±20	
555-2007	Red	650	0.9	3.0	5	±20	
555-2009	Red	635	0.6	1.0	5	±20	
555-2303	Green	565	2.5	4.7	5	±20	
555-2403	Yellow	583	2.1	4.7	5	±20	

INTEGRAL RESISTOR, VARIOUS VOLTAGES

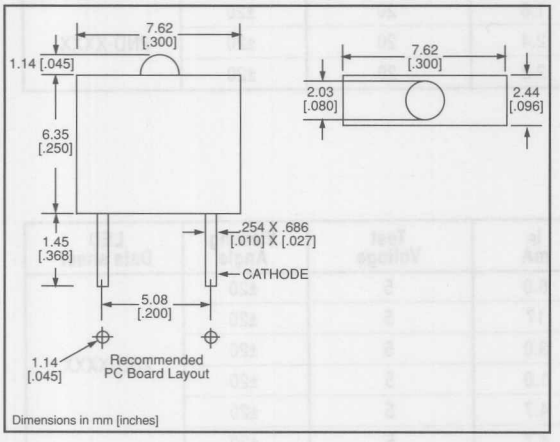
Part Number	Color	Wavelength nm	I_V mcd	I_F mA	Test Voltage	Viewing Angle	LED Data sheet
555-2002	Red	650	6.2	20	3.6	±20	2RD-XXXX
555-2005	Red	650	4.2	14	10	±20	
555-2006	Red	650	3.1	10	14	±20	
555-2008	Red	650	.9	3.0	24	±20	
555-2010	Red	650	.9	3.0	15	±20	

NOTE: See LED Data sheets for additional information.

2mm
LED CBI® Circuit Board Indicator
Single, Top View

Dialight

555-3XXX



PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
555-3001	Red	
555-3301	Green	2ND-XXXX
555-3401	Yellow	
INTEGRAL RESISTOR, 5 Volt		
555-3003	Red	
555-3004	Red	
555-3007	Red	2RD-XXXX
555-3009	Red	
555-3303	Green	
555-3403	Yellow	
INTEGRAL RESISTOR, VARIOUS VOLTAGES		
555-3002	Red, 3.6V	
555-3005	Red, 10V	
555-3006	Red, 14V	2RD-XXXX
555-3008	Red, 24V	
555-3010	Red, 15V	

Benefits

- Small 2mm design conserves board space
- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- Vibration and shock resistant
- High reliability - life measured in years
- Compatible with Quad Block 555 Series

LED Data

- For absolute maximum ratings, and other electrical/optical data, refer to LED data sheet.

Typical Operating Characteristics @ T_A = 25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
555-3001	Red	650	1.2	1.6	20	±20	2ND-XXXX
555-3301	Green	565	1.0	2.4	20	±20	
555-3401	Yellow	583	2.0	2.2	20	±20	

INTEGRAL RESISTOR - 5V

Part Number	Color	Wavelength nm	I_V mcd	I_F mA	Test Voltage	Viewing Angle	LED Data sheet
555-3003	Red	650	1.9	6.0	5	±20	2RD-XXXX
555-3004	Red	650	5.2	17	5	±20	
555-3007	Red	650	0.9	3.0	5	±20	
555-3009	Red	635	0.6	1.0	5	±20	
555-3303	Green	565	2.5	4.7	5	±20	
555-3403	Yellow	583	2.1	4.7	5	±20	

INTEGRAL RESISTOR, VARIOUS VOLTAGES

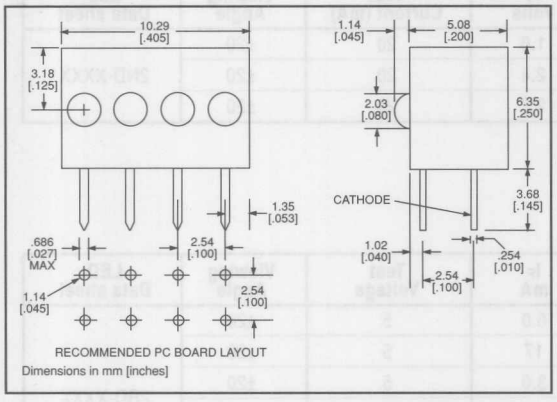
Part Number	Color	Wavelength nm	I_V mcd	I_F mA	Test Voltage	Viewing Angle	LED Data sheet
555-3002	Red	650	6.2	20	3.6	±20	2RD-XXXX
555-3005	Red	650	4.2	14	10	±20	
555-3006	Red	650	3.1	10	14	±20	
555-3008	Red	650	.9	3.0	24	±20	
555-3010	Red	650	.9	3.0	15	±20	

NOTE: See LED Data sheets for additional information.

2mm
LED CBI® Circuit Board Indicator
Quad

Dialight

555-4xxx



PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
555-4001	Red	
555-4301	Green	2ND-XXXX
555-4401	Yellow	
INTEGRAL RESISTOR, 5 Volt		
555-4003	Red	
555-4004	Red	
555-4007	Red	2RD-XXXX
555-4009	Red	
555-4303	Green	
555-4403	Yellow	

Benefits

- Quad block offers reduced insertions
- Small 2mm design conserves board space
- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- Vibration and shock resistant
- High reliability - life measured in years
- Compatible with Single 555 Series

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

Typical Operating Characteristics @ T_A = 25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
555-4001	Red	650	1.2	1.6	20	±20	2ND-XXXX
555-4301	Green	565	1.0	2.4	20	±20	
555-4401	Yellow	583	2.0	2.2	20	±20	

INTEGRAL RESISTOR - 5V

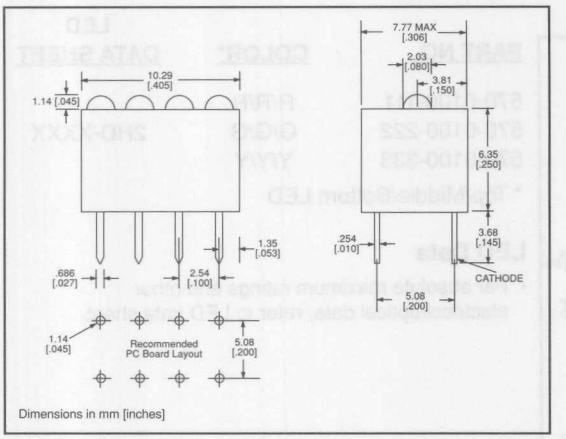
Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
555-4003	Red	650	1.9	5	6.0	±20	2RD-XXXX
555-4004	Red	650	5.2	5	17	±20	
555-4007	Red	650	0.9	5	3.0	±20	
555-4009	Red	635	0.6	5	1.0	±20	
555-4303	Green	565	2.5	5	4.7	±20	
555-4403	Yellow	583	2.1	5	4.7	±20	

NOTE: See LED Data sheets for additional information.

2mm
LED CBI® Circuit Board Indicator
Quad, Top View

Dialight

555-5xxx



Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
555-5001	Red	
555-5301	Green	2ND-XXXX
555-5401	Yellow	
INTEGRAL RESISTOR, 5 Volt		
555-5003	Red	
555-5004	Red	
555-5007	Red	2RD-XXXX
555-5009	Red	
555-5303	Green	
555-5403	Yellow	

Benefits

- Quad Block offers reduced insertions
- Small 2mm design conserves board space
- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- Vibration and shock resistant
- High reliability - life measured in years
- Compatible with Single 555 Series

LED Data

- See LED data sheet for max ratings, electrical, and optical data

Custom Combinations

- Contact factory for information on custom color combinations

Typical Operating Characteristics @ T_A = 25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
555-5001	Red	650	1.2	1.6	20	±20	2ND-XXXX
555-5301	Green	565	1.0	2.4	20	±20	
555-5401	Yellow	583	2.0	2.2	20	±20	

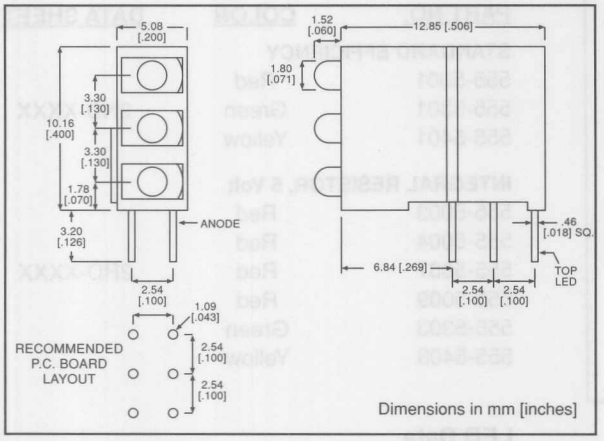
INTEGRAL RESISTOR - 5V

Part Number	Color	Wavelength nm	I_V mcd	I_F mA	Test Voltage	Viewing Angle	LED Data sheet
555-5003	Red	650	1.9	6.0	5	±20	2RD-XXXX
555-5004	Red	650	5.2	17	5	±20	
555-5007	Red	650	0.9	3.0	5	±20	
555-5009	Red	635	0.6	1.0	5	±20	
555-5303	Green	565	2.5	4.7	5	±20	
555-5403	Yellow	583	2.1	4.7	5	±20	

2mm
LED CBI® Circuit Board Indicator (DIN 41494 Compatible), Tri Level

Dialight

570-0100-xxx



PART NO.	COLOR*	LED DATA SHEET
570-0100-111	R/R/R	
570-0100-222	G/G/G	2HD-XXXX
570-0100-333	Y/Y/Y	

* Top/Middle/Bottom LED

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

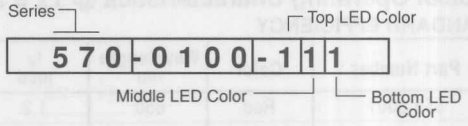
Benefits

- **DIN 41494 compatible**
- 2mm Trilevel for high density status indication
- Available with mixed colors
- Housing material UL94 V-0 rated
- Black case enhances contrast
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC board insertion - 3 LEDs

Custom Combinations

- Contact factory for information on custom color combinations.

EXAMPLE OF PART NUMBER ORDERING CODE



LED colors: 1) Red, 2) Green, 3) Yellow

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

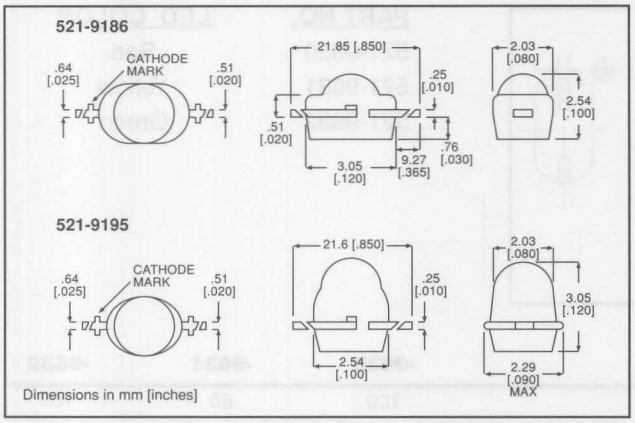
Part Number	Color	Wavelength nm	I_V* mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
570-0100-xxx	Red	635	12.6	2.0	20*	±19	2HD-XXXX
	Green	565	19.0	2.1	20*	±19	
	Yellow	585	8.7	2.1	20*	±19	

* I_V measured at 10mA

2mm Discrete LED
Miniature Axial Leaded
Tinted, Diffused

Dialight

521-9186, -9195



PART NO.	LED COLOR
521-9186	Red
521-9195	Red

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9186	-9195
Power dissipation (mW) Derating (mW/°C)	80 -1.1	80 -1.1
Forward Current (mA)	40	40
Peak Current (mA) *Pulse width = 1µs*	250	250
Operating Temperature (°C)	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100

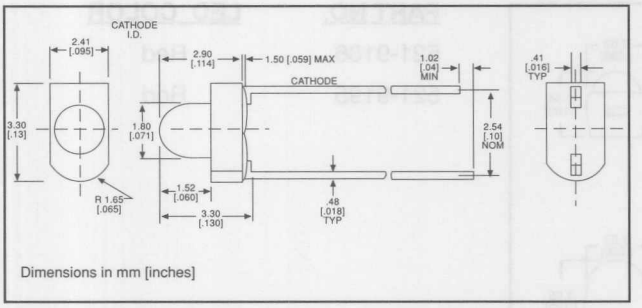
Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

OPERATING CHARACTERISTICS (T_A=25°C)		-9186	-9195
Luminous intensity (mcd) I_F=20mA *I_F=10mA	Min. Typical	0.5 1.0	*0.5 *2.0
Peak Wavelength (nm) λ Peak	Typical	660	660
Viewing Angle	Typical	±45°	±25°
Forward Voltage (V) I_F=20mA	Typical Max.	1.6 2.0	1.6 2.0
Reverse Voltage (V), I_R=100µA * I_R=10µA	Min.	3	*3

2mm Discrete LED
High Efficiency
Tinted, Diffused

Dialight

521-9630, -9631, -9632



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9630	Red
521-9631	Yellow
521-9632	Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9630	-9631	-9632
Power dissipation (mW)	100	60	100
Forward Current (mA)	30	20	30
Derating 9mmA/°C)	0.4[1]	0.25[1]	0.4[1]
Peak Current (mA) *Pulse width = 10µs*	120	80	120
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

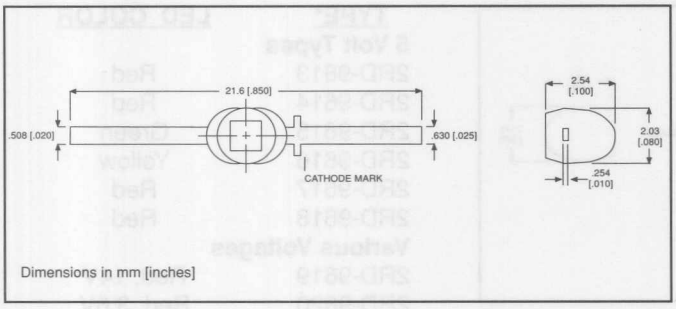
1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9630	-9631	-9632
Luminous intensity (mcd) I_F=20mA	Min. Typical	0.7 3.0	1.1 3.5	0.5 1.5
Peak Wavelength (nm) λ Peak	Typical	635	585	565
Viewing Angle	Typical	±38°	±38°	±38°
Forward Voltage (V) I_F=20mA	Typical Max.	2.0 2.8	2.1 2.8	2.1 2.8
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

2mm
Standard Efficiency
Tinted, Diffused

Dialight

2ND-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
2ND-9412	Red
2ND-9414	Green
2ND-9416	Yellow

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

3

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9412	-9414	-9416
Power dissipation (mW)	80	80	80
Derating (mW/°C)	1.1[1]	1.1[1]	1.1[1]
Forward Current (mA)	40	25	25
Peak Current (mA) *Pulse width = 1 µs*	250	250	250
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

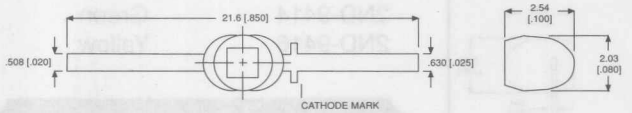
1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9412	-9414	-9416
Luminous intensity (mcd)	Min.	1.0	0.5	0.6
I_F=20mA	Typical	1.2	1.0	2
Peak Wavelength (nm) λ Peak	Typical	650	565	583
Viewing Angle	Typical	±20°	±20°	±20°
Forward Voltage (V)	Typical	1.6	2.4	2.2
I_F=20mA	Max.	2.0	3.0	3.0
Reverse Voltage (V), I_R=10µA	Min.	3.0	3.0	3.0

2mm
Integral Resistor
Tinted, Diffused

Dialight

2RD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5 Volt Types	
2RD-9613	Red
2RD-9614	Red
2RD-9615	Green
2RD-9616	Yellow
2RD-9617	Red
2RD-9618	Red
Various Voltages	
2RD-9619	Red, 14V
2RD-9620	Red, 3.6V
2RD-9621	Red, 10V
2RD-9622	Red, 15V
2RD-9623	Red, 24V

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C) 5 VOLT TYPE	**-9613**	**-9614**	**-9615**	**-9616**	**-9617**	**-9618**
Forward Voltage (V)	6	6	6	6	6	6
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

OPERATING CHARACTERISTICS (T_A=25°C) 5 VOLT TYPE		**-9613**	**-9614**	**-9615**	**-9616**	**-9617**	**-9618**
Luminous intensity (mcd)	Min.	.4	.8	.8	1.3	2.2	.3
V_F=5V	Typical	.9	1.9	2.5	2.1	5.2	.6
Peak Wavelength (nm) λ Peak	Typical	650	650	565	583	650	635
Viewing Angle	Typical	±20°	±20°	±20°	±20°	±20°	±20°
Forward Current (mA)	Typical	3.0	6.0	4.7	4.7	17	1.0
V_F=5V	Max.	4.0	8.0	6.7	6.7	21	2.6
Reverse Voltage (V), I_R=10μA	Min.	6	6	6	6	6	6

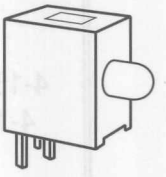
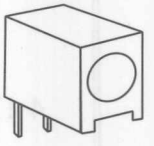
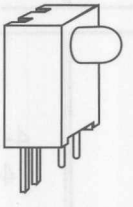
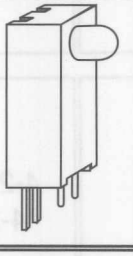
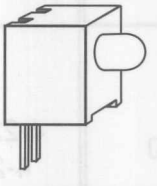
*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C) VARIOUS VOLTAGE TYPES	**-9619**	**-9620**	**-9621**	**-9622**	**-9623**
Forward Voltage	14	3.6	10	15	24
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

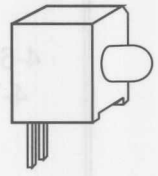
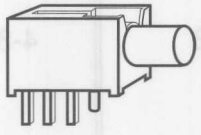
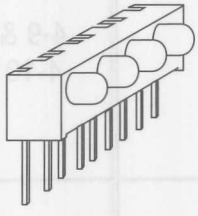
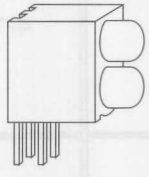
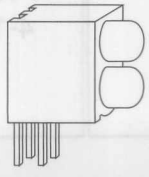
OPERATING CHARACTERISTICS (T_A=25°C) VARIOUS VOLTAGE TYPES		**-9619**	**-9620**	**-9621**	**-9622**	**-9623**
Luminous intensity (mcd)	Min.	1.3	2.6	1.8	.4	.4
V_F=Forward Voltage	Typical	3.1	6.2	4.2	.9	.9
Peak Wavelength (nm) λ Peak	Typical	650	650	650	650	650
Viewing Angle	Typical	±20°	±20°	±20°	±20°	±20°
Forward Current (mA)	Typical	10	20	14	3.0	3.0
V_F=Forward Voltage	Max.	15	25	18	3.8	3.8
Reverse Voltage (V), I_R=100µA	Typical	15	4.6	11	16	25

Selector Guide:
3mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	3mm LED CBI (DIN 41494 compatible)	551-XX01	4-6 & 4-7
	3mm LED CBI (Backlight)	551-XX02	4-8
	3mm LED CBI	551-XX03	4-9 & 4-10
	3mm LED CBI	551-XX04	4-11 & 4-12
	3mm LED CBI	551-XX07	4-13 & 4-14

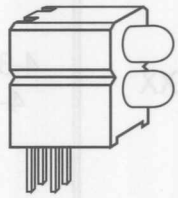
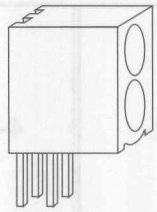
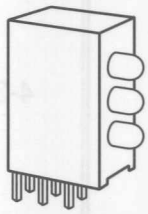
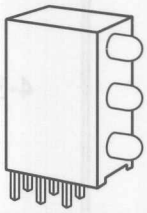
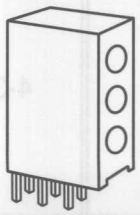
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Selector Guide:
3mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	3mm LED CBI	551-xx09	4-15 & 4-16
	3mm 3-Leaded Bicolor LED CBI	551-3508	4-17
	3mm Quad LED CBI	551-XX07-004	4-18 & 4-19
	3mm Bilevel LED CBI	553-XXXX	4-20 & 4-21
	3mm Bilevel LED CBI (DIN 41494 compatible)	553-XXXX-200	4-22 & 4-23

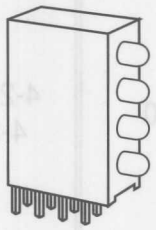
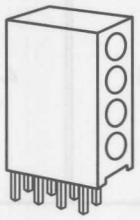
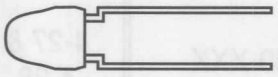
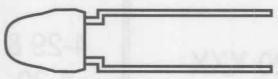
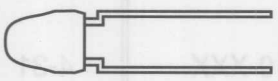
Selector Guide:

3mm LED Products

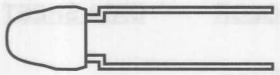
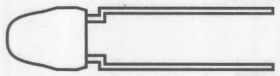
	DESCRIPTION	DATA SHEET	PAGE(s)
	3mm Bilevel LED CBI	553-XXXX-300	4-24 & 4-25
	3mm Bilevel LED CBI (Backlight)	553-22XX-100	4-26
	3mm Trilevel LED CBI	564-0X00-XXX	4-27 & 4-28
	3mm Trilevel LED CBI (DIN 41494 compatible)	564-0X20-XXX	4-29 & 4-30
	3mm Trilevel LED CBI (Backlight)	564-2210-XXX	4-31

4

Selector Guide:
3mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	3mm Quad Level LED CBI	568-0X0X-XXX	4-32 & 4-33
	3mm Quad-Level LED CBI (Backlight)	568-011x-xxx	4-34
	3mm LED (High efficiency, diffused)	521-9210 521-9211 521-9216	4-35
	3mm LED (Integral resistor, 5V, tinted, diffused)	521-9215 521-9322 521-9323	4-36
	3mm LED (Low current, 2mA, tinted, diffused)	521-9324 521-9325 521-9326	4-37

Selector Guide:
3mm LED Products

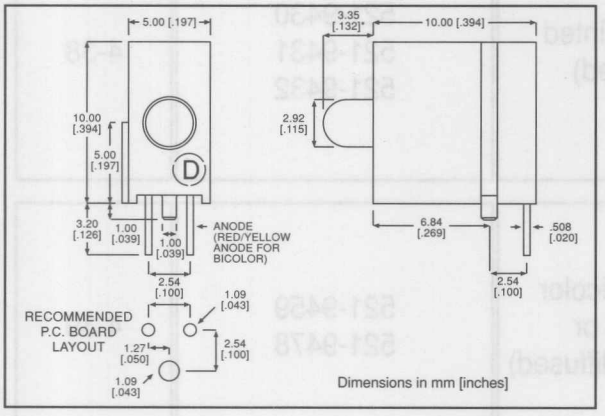
	DESCRIPTION	DATA SHEET	PAGE(s)
	3mm LED (Tinted non-diffused)	521-9430 521-9431 521-9432	4-38
	3mm LED (Bicolor [red/green or yellow/green], diffused)	521-9459 521-9478	4-39
	■ Snap-in LED mounting hardware	515-0006	4-40
Back-up 3mm LED Data Sheets for Reference Only			4-41 thru 4-46

4

3mm
LED CBI® Circuit Board Indicator
(DIN 41494 Compatible)

Dialight

551-xx01



PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
551-0201	Green	
551-0301	Yellow	3HD-XXXX
551-0401	Red	
INTEGRAL RESISTOR, 5V		
551-0501	Red	
551-0601	Green	3RD-XXXX
551-0701	Yellow	
LOW CURRENT		
551-1101	Red	
551-1201	Yellow	3LD-XXXX
551-1301	Green	
BICOLOR		
551-3001	Red/Green	3BD-XXXX
551-3101	Yellow/Green	

Benefits

- **DIN 41494 compatible**
- Available with a variety of LEDs
- Housing material UL94 V-0 rated
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-0201	Green	565	8.5	2.3	10	±30	3HD-XXXX
551-0301	Yellow	583	10	2.2	10	±30	
551-0401	Red	635	10	2.2	10	±30	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
551-0501	Red	635	4.0	5	10	±30	3RD-XXXX
551-0601	Green	565	8.0	5	12	±30	
551-0701	Yellow	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1101	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
551-1201	Yellow	583	1.6	1.9	2.0	±25	
551-1301	Green	565	1.6	1.8	2.0	±25	

BICOLOR

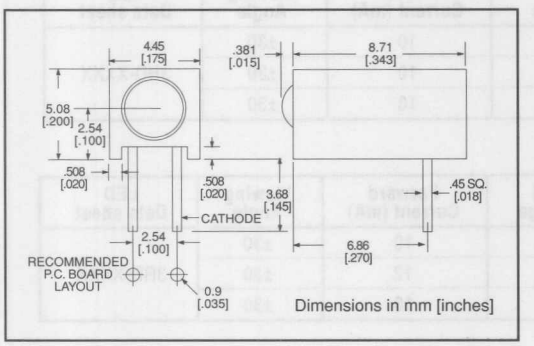
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-3001	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
551-3101	Yel/Green	585/565	5.0	2.0	10	±25	

Notes: 1.) Bicolor data shown as red/green and yellow/green
2.) See LED data sheet for additional information

3mm
LED CBI® Circuit Board Indicator
For Backlighting

Dialight

551-xx02

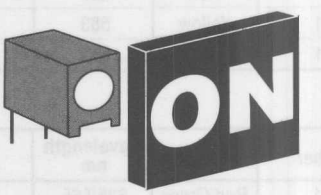


PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY, TINTED, NON DIFFUSED		
551-1502	Green	
551-1602	Yellow	3HN-XXXX
551-1702	Red	

Benefits

- High efficiency tinted, non-diffused LEDs
- Extended housing eliminates light bleed
- 3mm LED conserves space
- Narrow viewing angle
- High reliability - life measured in years
- Housing material meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment

TYPICAL BACKLIGHT APPLICATION



DIALIGHT'S EXTENDED HOUSING BACKLIGHTING PRODUCTS

This new family of products was designed specifically for backlight applications. Typical concerns when backlighting are brightness and control of adjacent LED bleed of color. This new family addresses both of these issues. First, the housing is extended around the LED, thus reducing bleed. Secondly, all of the extended housing family products are produced with tinted non-diffused LEDs. These have a narrow viewing angle. This further reduces bleed and results in a high intensity on axis light source.

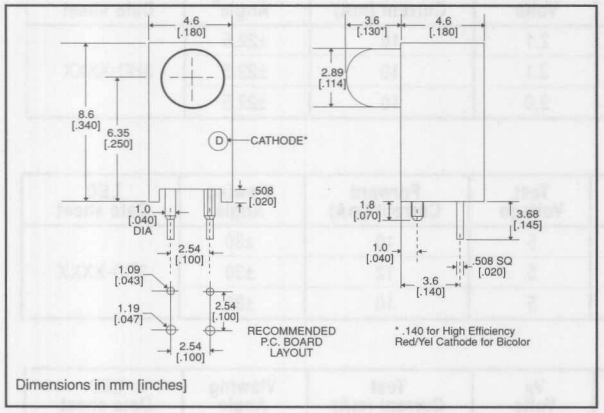
Typical Operating Characteristics @ T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1502	Green	565	12	2.3	10	±22.5	3HN-XXXX
551-1602	Yellow	583	12	2.2	10	±22.5	
551-1702	Red	635	12	2.2	10	±22.5	

3mm
LED CBI® Circuit Board Indicator
.250" High LED Centerline

Dialight

551-xx03



Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
551-0203	Green	
551-0303	Yellow	3HD-XXXX
551-0403	Red	
INTEGRAL RESISTOR, 5V		
551-0503	Red	
551-0603	Green	3RD-XXXX
551-0703	Yellow	
LOW CURRENT		
551-1103	Red	
551-1203	Yellow	3LD-XXXX
551-1303	Green	
BICOLOR		
551-3003	Red/Green	3BD-XXXX
551-3103	Yellow/Green	

Benefits

- Available with a variety of LEDs
- Housing material UL94V-0 rated
- Black case enhances contrast
- High reliability – life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning
- Locating pins for stability during soldering

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

4

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-0203	Green	563	16	2.1	10	±22.5	3HD-XXXX
551-0303	Yellow	583	6.3	2.1	10	±22.5	
551-0403	Red	650	10	2.0	10	±22.5	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
551-0503	Red	635	4.0	5	10	±30	3RD-XXXX
551-0603	Green	565	8.0	5	12	±30	
551-0703	Yellow	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1103	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
551-1203	Yellow	583	1.6	1.9	2.0	±25	
551-1303	Green	565	1.6	1.8	2.0	±25	

BICOLOR

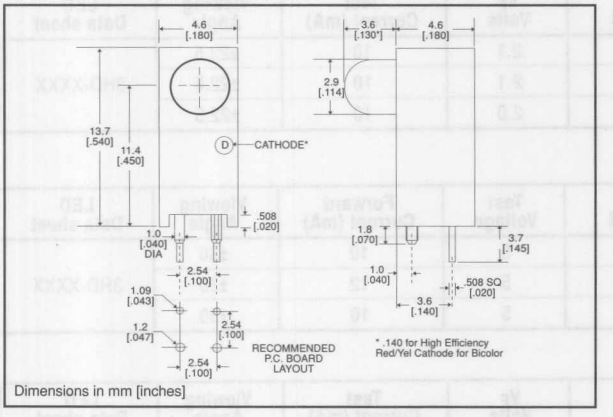
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-3003	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
551-3103	Yel/Green	585/565	5.0	2.0	10	±25	

Notes: 1.) Bicolor data shown as red/green and yellow/green
2.) See LED data sheet for additional information

3mm
LED CBI® Circuit Board Indicator
.450" High LED Centerline

Dialight

551-xx04



Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
551-0204	Green	
551-0304	Yellow	3HD-XXXX
551-0404	Red	
INTEGRAL RESISTOR, 5V		
551-0504	Red	
551-0604	Green	3RD-XXXX
551-0704	Yellow	
LOW CURRENT		
551-1104	Red	
551-1204	Yellow	3LD-XXXX
551-1304	Green	
BICOLOR		
551-3004	Red/Green	
551-3104	Yellow/Green	3BD-XXXX

Benefits

- Available with a variety of LEDs
- Housing material UL94 V-0 rated
- Black case enhances contrast
- High reliability – life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning
- Locating pins for stability during soldering

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-0204	Green	563	16	2.1	10	±22.5	3HD-XXXX
551-0304	Yellow	583	6.3	2.1	10	±22.5	
551-0404	Red	650	10	2.0	10	±22.5	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
551-0504	Red	635	4.0	5	10	±30	3RD-XXXX
551-0604	Green	565	8.0	5	12	±30	
551-0704	Yellow	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1104	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
551-1204	Yellow	583	1.6	1.9	2.0	±25	
551-1304	Green	565	1.6	1.8	2.0	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-3004	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
551-3104	Yel/Green	585/565	5.0	2.0	10	±25	

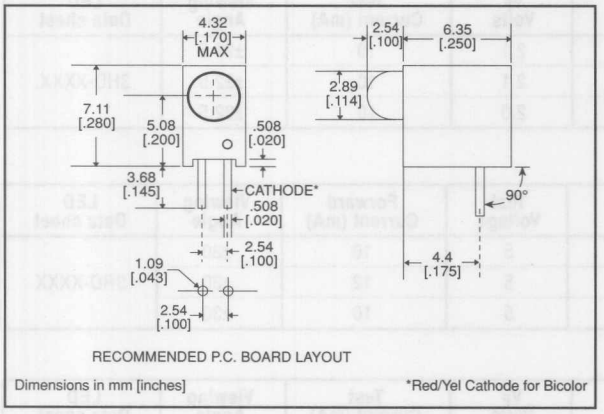
Notes: 1.) Bicolor data shown as red/green and yellow/green
2.) See LED data sheet for additional information

Dialight

3mm
LED CBI® Circuit Board Indicator
.200" High LED Centerline

Dialight

551-xx07



RECOMMENDED P.C. BOARD LAYOUT

Dimensions in mm [inches]

*Red/Yel Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
551-0207	Green	
551-0307	Yellow	3HD-XXXX
551-0407	Red	
INTEGRAL RESISTOR, 5V		
551-0507	Red	
551-0607	Green	3RD-XXXX
551-0707	Yellow	
LOW CURRENT		
551-1107	Red	
551-1207	Yellow	3LD-XXXX
551-1307	Green	
BICOLOR		
551-3007	Red/Green	3BD-XXXX
551-3107	Yellow/Green	

Benefits

- Available with a variety of LEDs
- Housing material UL94V-0 rated
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning
- Quad block (551-xx07-004) available for reduced insertions

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-0207	Green	563	16	2.1	10	±22.5	3HD-XXXX
551-0307	Yellow	583	6.3	2.1	10	±22.5	
551-0407	Red	650	10	2.0	10	±22.5	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
551-0507	Red	635	4.0	5	10	±30	3RD-XXXX
551-0607	Green	565	8.0	5	12	±30	
551-0707	Yellow	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1107	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
551-1207	Yellow	583	1.6	1.9	2.0	±25	
551-1307	Green	565	1.6	1.8	2.0	±25	

BICOLOR

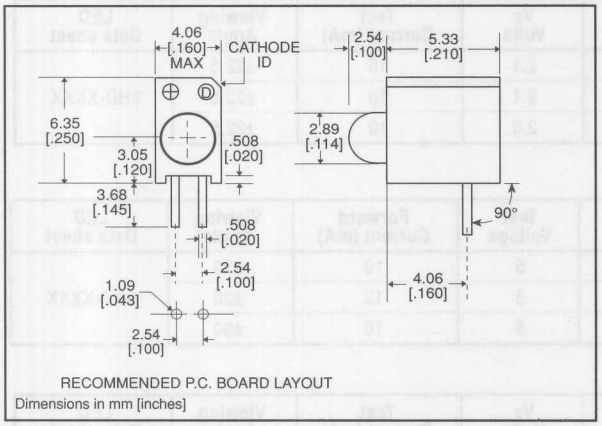
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-3007	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
551-3107	Yel/Green	585/565	5.0	2.0	10	±25	

Notes: 1.) Bicolor data shown as red/green and yellow/green
2.) See LED data sheet for additional information

3mm
LED CBI® Circuit Board Indicator
.120" High LED Centerline

Dialight

551-xx09



RECOMMENDED P.C. BOARD LAYOUT
Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
551-0209	Green	
551-0309	Yellow	3HD-XXXX
551-0409	Red	
INTEGRAL RESISTOR, 5V		
551-0509	Red	
551-0609	Green	3RD-XXXX
551-0709	Yellow	
LOW CURRENT		
551-1109	Red	
551-1209	Yellow	3LD-XXXX
551-1309	Green	
BICOLOR		
551-3009	Red/Green	3BD-XXXX
551-3109	Yellow/Green	

Benefits

- Available with a variety of LEDs
- Housing material UL94V-0 rated
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

4

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-0209	Green	563	16	2.1	10	±22.5	3HD-XXXX
551-0309	Yellow	583	6.3	2.1	10	±22.5	
551-0409	Red	650	10	2.0	10	±22.5	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
551-0509	Red	635	4.0	5	10	±30	3RD-XXXX
551-0609	Green	565	8.0	5	12	±30	
551-0709	Yellow	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1109	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
551-1209	Yellow	583	1.6	1.9	2.0	±25	
551-1309	Green	565	1.6	1.8	2.0	±25	

BICOLOR

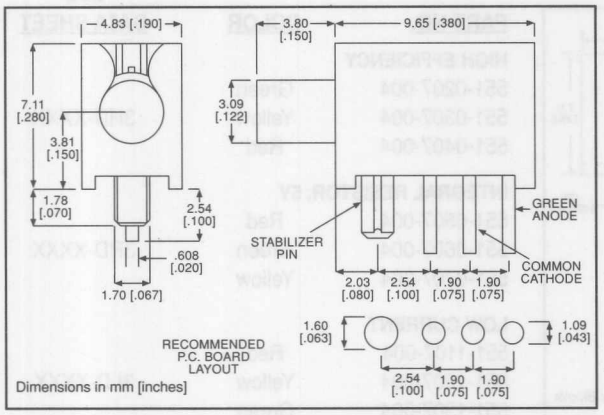
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-3009	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
551-3109	Yel/Green	585/565	5.0	2.0	10	±25	

Notes: 1.) Bicolor data shown as red/green and yellow/green
2.) See LED data sheet for additional information

3mm, Flat top
LED CBI® Circuit Board Indicator
In-line, 3 Leaded Bicolor

Dialight

551-3508



PART NO.	COLOR	LED DATA SHEET
551-3508	Red/Green	3TF-XXXX

4

Benefits

- Bicolor LED conserves board space
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability – life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning
- 3 leaded design simplifies drive circuitry

Application of Bicolor LEDs

A bicolor LED can produce a wide variety of colors in the range between the 2 colors. This function is achieved by varying the bias current or duty cycle that is applied to the device anodes. The Red/Green bicolor device will typically display an orange color when the current on the red terminal is equal to the current on the green terminal. By adjusting the individual average currents, the color displayed will shift closer to the color of the die that is conducting the higher average current. A 3-leaded bicolor LED allows simplicity in drive circuitry and separate current limiting resistors.

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

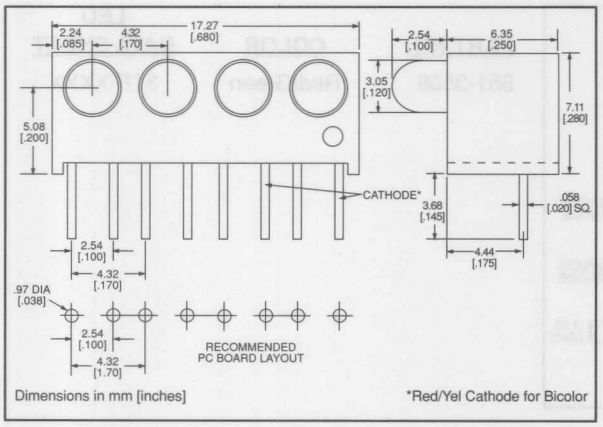
Typical Operating Characteristics @ T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	LED Data sheet
551-3508	Red/Green	630/560	4	2.0/2.1	20	3TF-XXXX

3mm
LED CBI® Circuit Board Indicator
Quad, .200" High LED Centerline

Dialight

551-xx07-004



PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
551-0207-004	Green	
551-0307-004	Yellow	3HD-XXXX
551-0407-004	Red	
INTEGRAL RESISTOR, 5V		
551-0507-004	Red	
551-0607-004	Green	3RD-XXXX
551-0707-004	Yellow	
LOW CURRENT		
551-1107-004	Red	
551-1207-004	Yellow	3LD-XXXX
551-1307-004	Green	
BICOLOR		
551-3007-004	Red/Green	3BD-XXXX
551-3107-004	Yellow/Green	

Benefits

- Available with a variety of LEDs
- Housing material UL94V-0 rated
- Black case enhances contrast
- High reliability – life measured in years
- Vibration and shock resistant
- Single PC Board insertion of 4 LEDs
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning
- Compatible with 551-xx07 Single CBI

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-0207-004	Green	563	16	2.1	10	±22.5	3HD-XXXX
551-0307-004	Yellow	583	6.3	2.1	10	±22.5	
551-0407-004	Red	650	10	2.0	10	±22.5	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
551-0507-004	Red	635	4.0	5	10	±30	3RD-XXXX
551-0607-004	Green	565	8.0	5	12	±30	
551-0707-004	Yellow	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-1107-004	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
551-1207-004	Yellow	583	1.6	1.9	2.0	±25	
551-1307-004	Green	565	1.6	1.8	2.0	±25	

BICOLOR

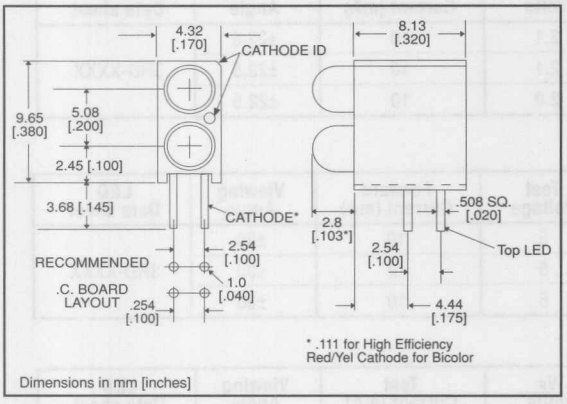
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
551-3007-004	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
551-3107-004	Yel/Green	585/565	5.0	2.0	10	±25	

Notes: 1.) Bicolor data shown as red/green and yellow/green
2.) See LED data sheet for additional information

3mm
LED CBI® Circuit Board Indicator
Bi-level

Dialight

553-xxxx



PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY - 01 TYPE		
553-0111	Red	
553-0122	Green	3HD-xxxx
553-0133	Yellow	
LOW CURRENT, 2mA - 02 TYPE		
553-0211	Red	
553-0222	Green	3LD-xxxx
553-0233	Yellow	
RESISTOR 5V - 03 TYPE		
553-0311	Red	
553-0322	Green	3RD-xxxx
553-0333	Yellow	
BICOLOR - 07 TYPE		
553-0711	Red/Green	3BD-xxxx
553-0744	Yellow/Green	
NON-DIFFUSED - 22 TYPE		
553-2211	Red	
553-2222	Green	3HN-xxxx
553-2233	Yellow	

* Top/Bottom LED

Benefits

- Available in a variety of LEDs
- Standoffs on housing facilitate PC board cleaning
- Bi-level design conserves board space
- Black case enhances contrast
- High reliability - life measured in years
- Housing meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion 2 LEDs

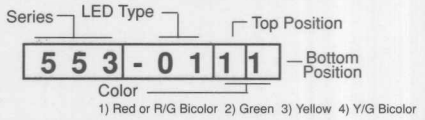
Custom Combinations

- Contact factory for information on custom color combinations and bilevel arrays.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheets

EXAMPLE OF PART NUMBER ORDERING CODE



Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0111	Red	630	10	2.0	10	±22.5	3HD-xxxx
553-0122	Green	569	16	2.1	10	±22.5	
553-0133	Yellow	587	6.3	2.1	10	±22.5	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0211	Red	635	1.6	1.8	2.0	±25	3LD-xxxx
553-0222	Green	565	1.6	1.9	2.0	±25	
553-0233	Yellow	583	1.6	1.9	2.0	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
553-0311	Red	635	8.0	5	10	±30	3RD-xxxx
553-0322	Green	565	8.0	5	12	±30	
553-0333	Yellow	583	8.0	5	10	±30	

BICOLOR

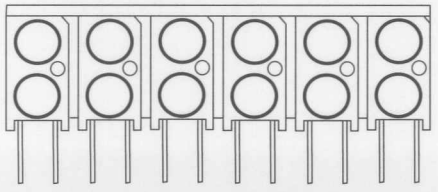
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0711	Red/Green	635/565	6.3	2.0	10	±30	3BD-xxxx
553-0744	Yel/Gr	585/565	5.0	2.0	10	±30	

NON-DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-2211	Red	635	12	2.2	10.0	±22.5	3HN-xxxx
553-2222	Green	565	12	2.3	10.0	±22.5	
553-2233	Yellow	583	12	2.2	10.0	±22.5	

NOTES: 1) See LED Data Sheet for additional information
2) Bicolor information is R/G or Y/G as applicable

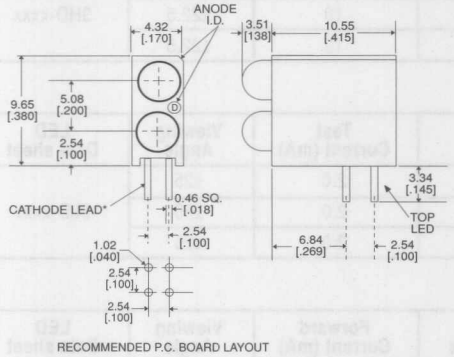
When multiple CBI's are used, Dialight offers its multiarray to reduce insertions and assure LED alignment. The assemblies are available in arrays of 2 to 6 bilevels. Contact factory for details.



3mm
LED CBI® Circuit Board Indicator (DIN 41494 Compatible), Bi-level

Dialight

553-xxxx-200



Dimensions in mm [inches]

*Red/Yel Cathode for Bicolor

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY - 01 TYPE		
553-0111-200	Red	
553-0122-200	Green	3HD-xxxx
553-0133-200	Yellow	
LOW CURRENT, 2mA - 02 TYPE		
553-0211-200	Red	
553-0222-200	Green	3LD-xxxx
553-0233-200	Yellow	
RESISTOR 5V - 03 TYPE		
553-0311-200	Red	
553-0322-200	Green	3RD-xxxx
553-0333-200	Yellow	
BICOLOR - 07 TYPE		
553-0711-200	Red/Green	3BD-xxxx
553-0744-200	Yellow/Green	
NON-DIFFUSED - 22 TYPE		
553-2211-200	Red	
553-2222-200	Green	3HN-xxxx
553-2233-200	Yellow	

* Top/Bottom LED

Benefits

- **DIN 41494 compatible**
- Available in a variety of LEDs
- Standoffs on housing facilitate PC board cleaning
- Bi-level design conserves board space
- Single PC Board insertion 2 LEDs
- Black case enhances contrast
- High reliability - life measured in years
- Housing meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment

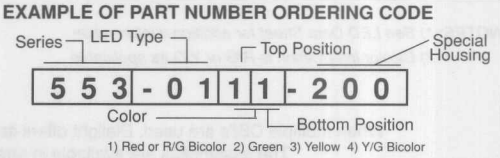
Custom Combinations

- Contact factory for information on custom color combinations and bilevel arrays.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheets

EXAMPLE OF PART NUMBER ORDERING CODE



Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0111-200	Red	635	10	2.2	10	±30	3HD-xxxx
553-0122-200	Green	565	8.5	2.3	10	±30	
553-0133-200	Yellow	583	10	2.2	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0211-200	Red	635	1.6	1.8	2.0	±25	3LD-xxxx
553-0222-200	Green	565	1.6	1.9	2.0	±25	
553-0233-200	Yellow	583	1.6	1.9	2.0	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
553-0311-200	Red	635	8.0	5	10	±30	3RD-xxxx
553-0322-200	Green	565	8.0	5	12	±30	
553-0333-200	Yellow	583	8.0	5	10	±30	

BICOLOR

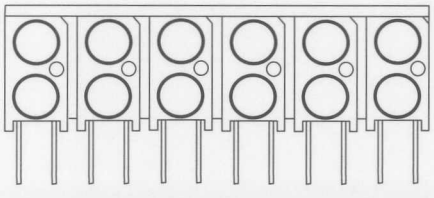
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0711-200	Red/Green	635/565	6.3	2.0	10	±30	3BD-xxxx
553-0744-200	Yel/Gr	585/565	5.0	2.0	10	±30	

NON-DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-2211-200	Red	635	12	2.2	10.0	±22.5	3HN-xxxx
553-2220-200	Green	565	12	2.3	10.0	±22.5	
553-2233-200	Yellow	583	12	2.2	10.0	±22.5	

NOTES: 1) See LED Data Sheet for additional information
2) Bicolor information is R/G or Y/G as applicable

When multiple CBI's are used, Dialight offers its multiarray to reduce insertions and assure LED alignment. The assemblies are available in arrays of 2 to 6 bilevels. Contact factory for details.

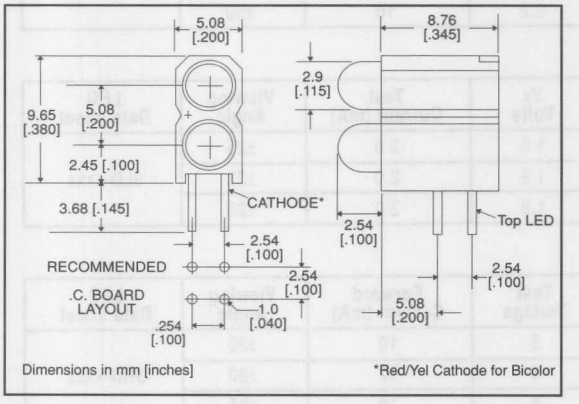


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3mm
LED CBI® Circuit Board Indicator
Bi-level

Dialight

553-xxxx-300



PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY - 01 TYPE		
553-0111-300	Red	
553-0122-300	Green	3HD-xxxx
553-0133-300	Yellow	
LOW CURRENT, 2mA - 02 TYPE		
553-0211-300	Red	
553-0222-300	Green	3LD-xxxx
553-0233-300	Yellow	
RESISTOR 5V - 03 TYPE		
553-0311-300	Red	
553-0322-300	Green	3RD-xxxx
553-0333-300	Yellow	
BICOLOR - 07 TYPE		
553-0711-300	Red/Green	3BD-xxxx
553-0744-300	Yellow/Green	
NON-DIFFUSED - 22 TYPE		
553-2211-300	Red	
553-2222-300	Green	3HN-xxxx
553-2233-300	Yellow	

Benefits

- Available with a variety of LEDs
- Standoffs on housing facilitate PC board cleaning
- Bi-level design conserves board space
- Black case enhances contrast
- High reliability - life measured in years
- Housing meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion 2 LEDs

Custom Combinations

- Contact factory for information on custom color combinations and bilevel arrays.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheets

EXAMPLE OF PART NUMBER ORDERING CODE

Series — LED Type — Top Position — Bottom Position

5 5 3 - 0 1 1 1 - 3 0 0

Color

1) Red or R/G Bicolor 2) Green 3) Yellow 4) Y/G Bicolor

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0111-300	Red	630	10	2.0	10	±22.5	3HD-xxxx
553-0122-300	Green	569	16	2.1	10	±22.5	
553-0133-300	Yellow	587	6.3	2.1	10	±22.5	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0211-300	Red	635	1.6	1.8	2.0	±25	3LD-xxxx
553-0222-300	Green	565	1.6	1.9	2.0	±25	
553-0233-300	Yellow	583	1.6	1.9	2.0	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0311-300	Red	635	8.0	5	15	±30	3RD-xxxx
553-0322-300	Green	565	8.0	5	15	±30	
553-0333-300	Yellow	583	8.0	5	15	±30	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-0711-300	Red/Green	635/565	6.3	2.0	10	±30	3BD-xxxx
553-0744-300	Yel/Gr	585/565	5.0	2.0	10	±30	

NON-DIFFUSED

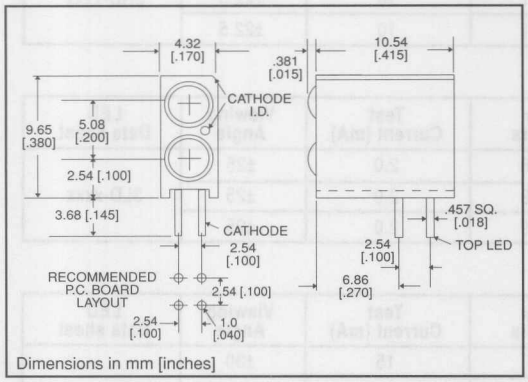
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
553-2211-300	Red	635	12	2.2	10.0	±22.5	3HN-xxxx
553-2222-300	Green	565	12	2.3	10.0	±22.5	
553-2233-300	Yellow	583	12	2.2	10.0	±22.5	

NOTES: 1) See LED Data Sheet for additional information
2) Bicolor information is R/G or Y/G as applicable

3mm
LED CBI® Circuit Board Indicator
Bi-level For Backlighting

Dialight

553-22xx-100



Dimensions in mm [inches]

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY, TINTED, NON DIFFUSED		
553-2211-100	Red/Red	
553-2222-100	Green/Green	
553-2223-100	Green/Yellow	3HN-XXXX
553-2232-100	Yellow/Green	
553-2233-100	Yellow/Yellow	

* Top/Bottom LED

EXAMPLE OF PART NUMBER ORDERING CODE

SERIES — Top LED — Bottom LED

553-22XX-100

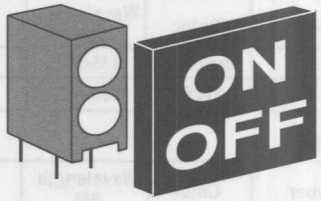
Benefits

- High efficiency tinted, non-diffused LEDs
- Extended housing eliminates light bleed
- Bi-level design conserves board space
- Narrow viewing angle
- High reliability - life measured in years
- Housing material meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion 2 LEDs

Custom Combinations

- Contact factory for information on custom color combinations and bilevel arrays.

TYPICAL BACKLIGHT APPLICATION



DIALIGHT'S EXTENDED HOUSING BACKLIGHTING PRODUCTS

This new family of products was designed specifically for backlight applications. Typical concerns when backlighting are brightness and control of adjacent LED bleed of color. This new family addresses both of these issues. First, the housing is extended around the LED, thus reducing bleed. Secondly, all of the extended housing family products are produced with tinted non-diffused LEDs. These have a narrow viewing angle. This further reduces bleed and results in a high intensity on axis light source.

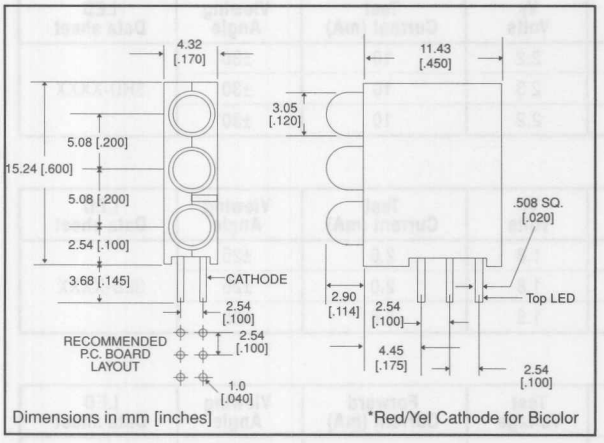
Typical Operating Characteristics @ T_A=25°C

Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
Red	635	12	2.2	10	±22.5	3HN-XXXX
Green	565	12	2.3	10	±22.5	
Yellow	583	12	2.2	10	±22.5	

3mm
LED CBI® Circuit Board Indicator
Tri Level

Dialight

564-0x00-xxx



Dimensions in mm [inches]

*Red/Yel Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY - 0100 TYPE		
564-0100-111	R/R/R	
564-0100-222	G/G/G	3HD-XXXX
564-0100-132	R/Y/G	
LOW CURRENT - 0200 TYPE		
564-0200-111	R/R/R	
564-0200-222	G/G/G	3LD-XXXX
564-0200-132	R/Y/G	
INTEGRAL RESISTOR, 5V - 0300 TYPE		
564-0300-111	R/R/R	
564-0300-222	G/G/G	3RD-XXXX
564-0300-132	R/Y/G	
BICOLOR - 0700 TYPE		
564-0700-111	R•G/R•G/R•G	
564-0700-444	Y•G/Y•G/Y•G	3BD-XXXX

4

Benefits

- Trilevel design conserves board space
- Available with a variety of LEDs
- Housing material UL94 V-0 rated
- Black case enhances contrast
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single insertion - 3 LEDs
- Standoffs on housing facilitate PC board cleaning

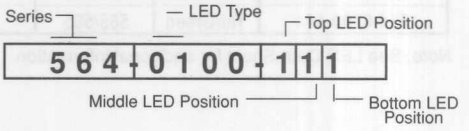
Custom Combinations

- Contact factory for information on custom color combinations and arrays.

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

EXAMPLE OF PART NUMBER ORDERING CODE



LED colors: 1) Red or R/G Bicolor, 2) Green, 3) Yellow, 4) Y/G Bicolor

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-0100-xxx	Red	635	10	2.2	10	±30	3HD-XXXX
	Green	565	8.5	2.3	10	±30	
	Yellow	583	10	2.2	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-0200-xxx	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
	Green	565	1.6	1.8	2.0	±25	
	Yellow	583	1.6	1.9	2.0	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
564-0300-xxx	Red	635	4.0	5	10	±30	3RD-XXXX
	Green	565	8.0	5	12	±30	
	Yellow	583	8.0	5	10	±30	

BICOLOR

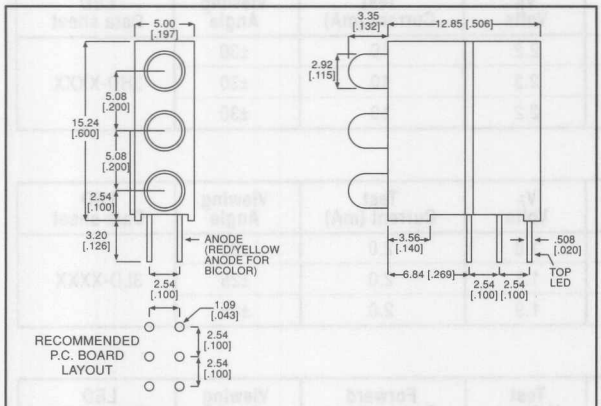
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-0700-111	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
564-0700-444	Yel/Green	585/565	5.0	2.0	10	±25	

Note: See LED Data Sheet for additional information.

3mm
LED CBI® Circuit Board Indicator (DIN 41494 Compatible), Tri Level

Dialight

564-0x20-xxx



Dimensions in mm [inches]

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY - 0100 TYPE		
564-0120-111	R/R/R	
564-0120-222	G/G/G	3HD-XXXX
564-0120-132	R/Y/G	
LOW CURRENT - 0200 TYPE		
564-0220-111	R/R/R	
564-0220-222	G/G/G	3LD-XXXX
564-0220-132	R/Y/G	
INTEGRAL RESISTOR, 5V - 0300 TYPE		
564-0320-111	R/R/R	
564-0320-222	G/G/G	3RD-XXXX
564-0320-132	R/Y/G	
BICOLOR - 0700 TYPE		
564-0720-111	R•G/R•G/R•G	
564-0720-444	Y•G/Y•G/Y•G	3BD-XXXX

* Top/Middle/Bottom LED

Benefits

- **DIN 41494 compatible**
- Trilevel design conserves board space
- Available with a variety of LEDs
- Housing material UL94V-0 rated
- Black case enhances contrast
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single insertion - 3 LEDs
- Standoffs on housing facilitate PC board cleaning

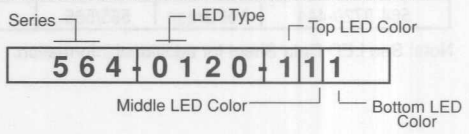
Custom Combinations

- Contact factory for information on custom color combinations and arrays.

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

EXAMPLE OF PART NUMBER ORDERING CODE



LED colors: 1) Red or R/G Bicolor, 2) Green, 3) Yellow, 4) Y/G Bicolor

4

564-0x20-xxx
(DIN41994 Commpatible)

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-0120-xxx	Red	635	10	2.2	10	±30	3HD-XXXX
	Green	565	8.5	2.3	10	±30	
	Yellow	583	10	2.2	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-0220-xxx	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
	Green	565	1.6	1.8	2.0	±25	
	Yellow	583	1.6	1.9	2.0	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
564-0320-xxx	Red	635	4.0	5	10	±30	3RD-XXXX
	Green	565	8.0	5	12	±30	
	Yellow	583	8.0	5	10	±30	

BICOLOR

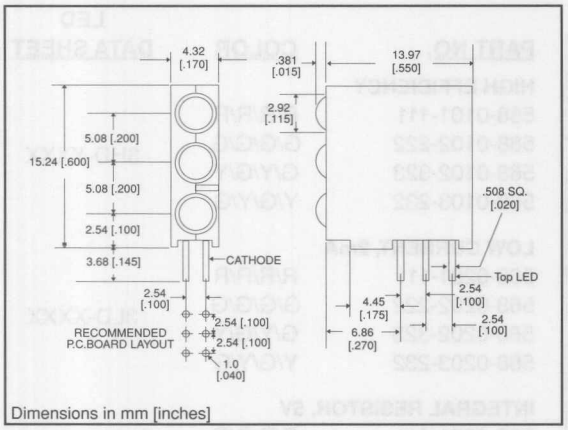
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-0720-111	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
564-0720-444	Yel/Green	585/565	5.0	2.0	10	±25	

Note: See LED Data Sheet for additional information.

3mm
LED CBI® Circuit Board Indicator
Tri Level For Backlighting

Dialight

564-2210-xxx



Dimensions in mm [inches]

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY, TINTED, NON DIFFUSED		
564-2210-111	Red/Red/Red	
564-2210-222	Green/Green/Green	3HN-XXXX
564-2210-333	Yellow/Yellow/Yellow	

* Top/Middle/Bottom LED

EXAMPLE OF PART NUMBER ORDERING CODE

Series — 564-2210-XXX — Top LED

Middle LED — Bottom LED

4

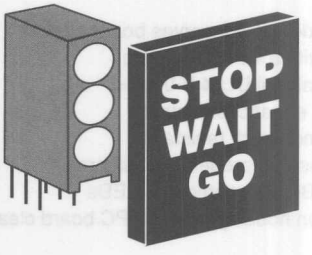
Benefits

- High efficiency tinted, non-diffused LEDs
- Extended housing eliminates light bleed
- Tri-level design conserves board space
- Narrow viewing angle
- High reliability - life measured in years
- Housing material meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion 3 LEDs

Custom Combinations

- Contact factory for information on custom color combinations and arrays.

TYPICAL BACKLIGHT APPLICATION



DIALIGHT'S EXTENDED HOUSING BACKLIGHTING PRODUCTS

This new family of products was designed specifically for backlight applications. Typical concerns when backlighting are brightness and control of adjacent LED bleed of color. This new family addresses both of these issues. First, the housing is extended around the LED, thus reducing bleed. Secondly, all of the extended housing family products are produced with tinted non-diffused LEDs. These have a narrow viewing angle. This further reduces bleed and results in a high intensity on axis light source.

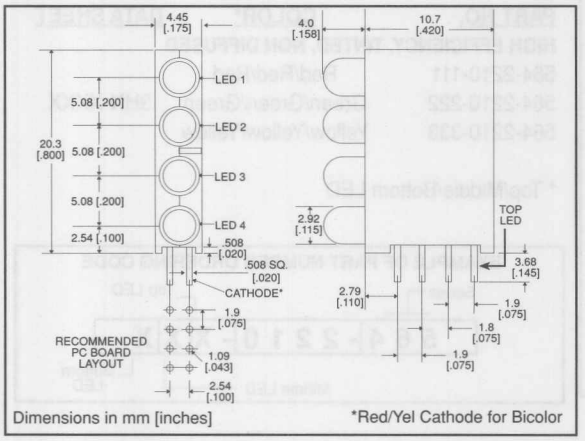
Typical Operating Characteristics @ T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
564-2210-111	Red	635	12	2.2	10	±22.5	3HN-XXXX
564-2210-222	Green	565	12	2.3	10	±22.5	
564-2210-333	Yellow	583	12	2.2	10	±22.5	

3mm
LED CBI® Circuit Board Indicator
Quad Level

Dialight

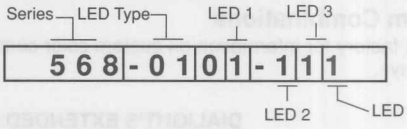
568-0x0x-xxx



Dimensions in mm [inches] *Red/Yel Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
568-0101-111	R/R/R/R	
568-0102-222	G/G/G/G	3HD-XXXX
568-0102-323	G/Y/G/Y	
568-0103-232	Y/G/Y/G	
LOW CURRENT, 2mA		
568-0201-111	R/R/R/R	
568-0202-222	G/G/G/G	3LD-XXXX
568-0202-323	G/Y/G/Y	
568-0203-232	Y/G/Y/G	
INTEGRAL RESISTOR, 5V		
568-0301-111	R/R/R/R	
568-0302-222	G/G/G/G	3RD-XXXX
568-0302-323	G/Y/G/Y	
568-0303-232	Y/G/Y/G	
BICOLOR		
568-0701-111	R•G/R•G/R•G/R•G	
568-0704-444	Y•G/Y•G/Y•G/Y•G	3BD-XXXX

EXAMPLE OF PART NUMBER ORDERING CODE



LED colors: 1) Red or R/G Bicolor, 2) Green, 3) Yellow, 4) Y/G Bicolor

Benefits

- Quadlevel design conserves board space
- Available with a variety of LEDs
- Housing material UL94 V-0 rated
- Black case enhances contrast
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion - 4 LEDs
- Standoffs on housing facilitate PC board cleaning

Custom Combinations

- Contact factory for information on custom color combinations and arrays.

LED Data

- For absolute maximum ratings and other electrical/optical data, refer to LED data sheet.

Dialight

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
568-010x-xxx	Red	635	10	2.2	10	±30	3HD-XXXX
	Green	565	8.5	2.3	10	±30	
	Yellow	583	10	2.2	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
568-020x-xxx	Red	635	1.8	1.8	2.0	±25	3LD-XXXX
	Green	565	1.6	1.8	2.0	±25	
	Yellow	583	1.6	1.9	2.0	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
568-030x-xxx	Red	635	4.0	5	10	±30	3RD-XXXX
	Green	565	8.0	5	12	±30	
	Yellow	583	8.0	5	10	±30	

BICOLOR

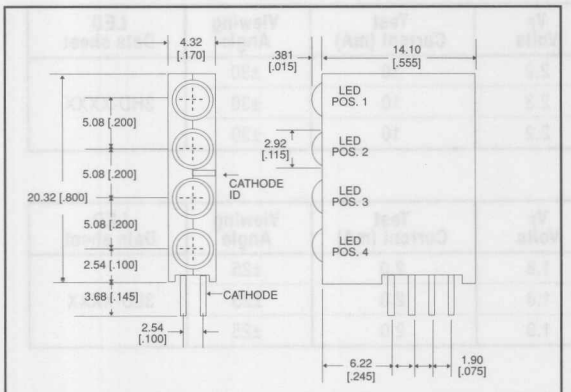
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
568-0701-111	Red/Green	635/565	5.0	2.0	10	±25	3BD-XXXX
568-0704-444	Yel/Green	585/565	5.0	2.0	10	±25	

Note: See LED Data Sheet for additional information.

3mm
LED CBI® Circuit Board Indicator
Quad Level For Backlighting

Dialight

568-011x-xxx

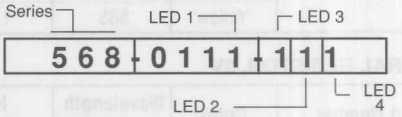


Dimensions in mm [inches]

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY, TINTED, NON DIFFUSED		
568-0111-111	Red/Red/Red/Red	
568-0112-222	Green/Green/Green/Green	3HN-XXXX
568-0112-323	Green/Yellow/Green/Yellow	
568-0113-232	Yellow/Green/Yellow/Green	

* LED 1, LED 2, LED 3, LED4.

EXAMPLE OF PART NUMBER ORDERING CODE



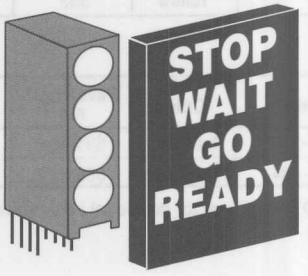
Benefits

- High efficiency tinted, non-diffused LEDs
- Extended housing eliminates light bleed
- Quad-level design conserves board space
- Narrow viewing angle
- High reliability - life measured in years
- Housing material meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion 4 LEDs

Custom Combinations

- Contact factory for information on custom color combinations and arrays.

TYPICAL BACKLIGHT APPLICATION



DIALIGHT'S EXTENDED HOUSING BACKLIGHTING PRODUCTS

This new family of products was designed specifically for backlight applications. Typical concerns when backlighting are brightness and control of adjacent LED bleed of color. This new family addresses both of these issues. First, the housing is extended around the LED, thus reducing bleed. Secondly, all of the extended housing family products are produced with tinted non-diffused LEDs. These have a narrow viewing angle. This further reduces bleed and results in a high intensity on axis light source.

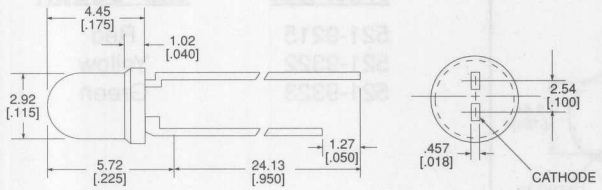
Typical Operating Characteristics @ T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
568-011x-xxx	Red	635	12	2.2	10	±22.5	3HN-XXXX
	Green	565	12	2.3	10	±22.5	
	Yellow	583	12	2.2	10	±22.5	

3mm Discrete LED
High Efficiency
Diffused

Dialight

521-9210, -9211, -9216



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9210	Green
521-9211	Yellow
521-9216	Red

4

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9210	-9211	-9216
Power dissipation (mW)	135	85	135
Derating (mW/°C)	1.8[1]	1.6[1]	1.8[1]
Forward Current (mA)	25	30	30
Peak Current (mA) *Pulse width = 10 µs*	90	90	90
Operating Temperature (°C)	-20/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

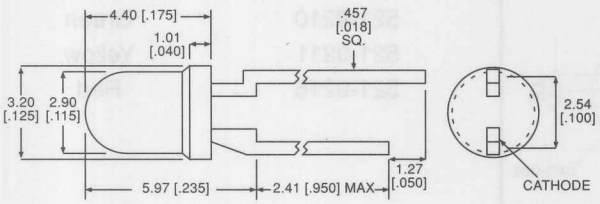
1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9210	-9211	-9216
Luminous intensity (mcd)	Min.	4.0	6.0	6.0
I_F=10mA	Typical	8.5	10	10
Peak Wavelength (nm) λ Peak	Typical	565	583	635
Viewing Angle	Typical	±30°	±30°	±30°
Forward Voltage (V)	Typical	2.3	2.2	2.2
I_F=10mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

3mm Discrete LED
Integral Resistor, 5V
Tinted, Diffused

Dialight

521-9215, -9322, -9323



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9215	Red
521-9322	Yellow
521-9323	Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9215	-9322	-9323
Forward Voltage (V)	7.5	7.5	7.5
Derating (V/°C)	.071[1]	.071[1]	.071[1]
Operating Temperature (°C)	-40/+85	-40/+85	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

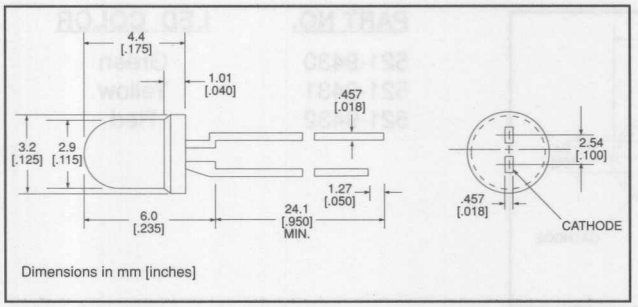
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9215	-9322	-9323
Luminous intensity (mcd)	Min.	1.5	2.0	2.0
V_F=5V	Typical	4.0	8.0	8.0
Dominant Wavelength (nm) λ Dom.	Typical	626	585	569
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±30°	±30°	±30°
Forward Current (mA)	Typical	10	10	12
V_F=5V	Max.	15	15	15
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

3mm Discrete LED
Low Current
Tinted, Diffused

Dialight

521-9324, -9325, -9326



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9324	Red
521-9325	Yellow
521-9326	Green

4

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9324	-9325	-9326
Power dissipation (mW)	24	36	24
Forward Current (mA) Derating (mA/°C)	7 1.0[1]	7 1.0[1]	7 1.0[1]
Peak Current (mA) *Pulse width = 10 µs*	500	500	500
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

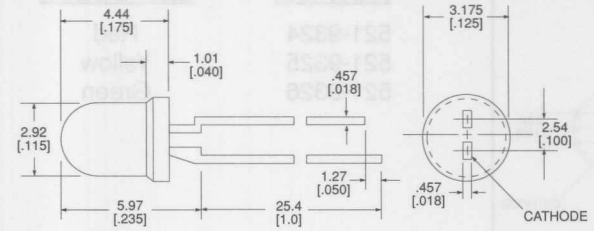
1. From 92°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9324	-9325	-9326
Luminous intensity (mcd) I_F=2mA	Min. Typical	1.0 1.8	1.0 1.6	1.0 1.6
Dominant Wavelength (nm) λ Dom.	Typical	626	598	569
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±25°	±25°	±25°
Forward Voltage (V) I_F=2mA	Typical Max.	1.8 2.2	1.9 2.7	1.8 2.2
Reverse Voltage (V), I_R=50µA	Min.	5.0	5.0	5.0

3mm Discrete LED
High Efficiency
Tinted, Non-Diffused

Dialight

521-9430, -9431, -9432



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9430	Green
521-9431	Yellow
521-9432	Red

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9430	-9431	-9432
Power dissipation (mW)	135	85	135
Derating (mW/°C)	1.8	1.6[1]	1.8
Forward Current (mA)	30	20	30
Peak Current (mA) *Pulse width = 10µs*	500	500	500
Operating Temperature (°C)	-20/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

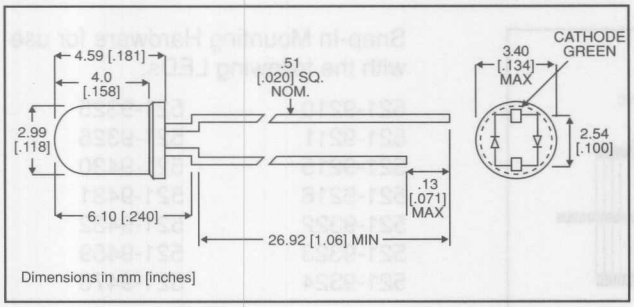
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9430	-9431	-9432
Luminous intensity (mcd)	Min.	4.2	6.0	8.6
I_F=10mA	Typical	1.8	1.6	1.8
Peak Wavelength (nm) λ Peak	Typical	565	583	635
Viewing Angle	Typical	±22.5°	±22.5°	±22.5°
Forward Voltage (V)	Typical	2.3	2.2	2.2
I_F=10mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Typical	5.0	5.0	5.0

3mm Discrete LED
High Efficiency Bi-Color
Diffused

Dialight

521-9459, -9478



PART NO.	LED COLOR
521-9459	Red/Green
521-9478	Yellow/Green

4

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9459	-9478
Power dissipation (mW)	150	150
Forward Current (mA)	45	45
Derating (mA/°C)[1]	0.6	0.6
Peak Current (mA) *Pulse width = 10µs*	1000	1000
Operating Temperature (°C)	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 25°C

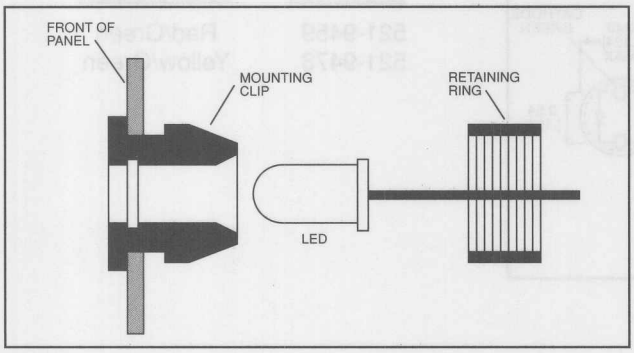
OPERATING CHARACTERISTICS (T_A=25°C)		-9459	-9478
Luminous intensity (mcd)	Min.	2.5	2.5
I_F=10mA	Typical	4.0	5.0
Dominant Wavelength (nm) λ Dom.	Typical	628/570	590/570
Peak Wavelength (nm) λ Peak	Typical	635/565	585/565
Viewing Angle	Typical	±25°	±30°
Forward Voltage (V)	Typical	2.0	2.0
I_F=10mA	Max.	2.6	2.6

Note: Data shown as Red/Green or Yellow/Green as applicable.

3mm LED
Snap-In Mounting Hardware

Dialight

515-0006

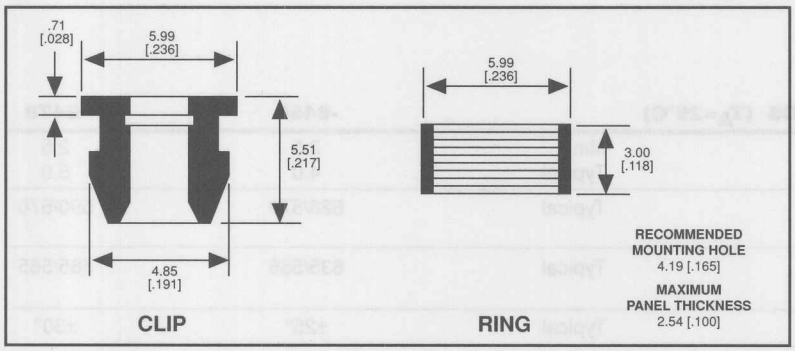


Snap-In Mounting Hardware for use with the following LEDs:

521-9210	521-9325
521-9211	521-9326
521-9215	521-9430
521-9216	521-9431
521-9322	521-9432
521-9323	521-9459
521-9324	521-9478

Mounting Instructions

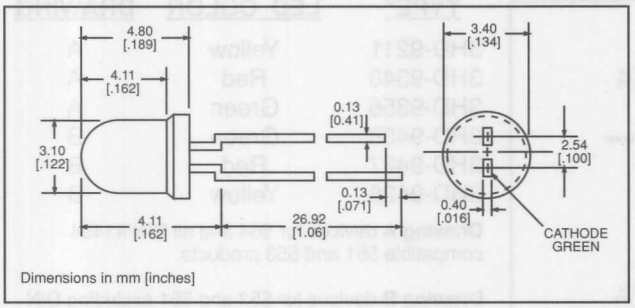
1. Snap Mounting Clip into front of Panel.
2. Insert LED Lamp into Mounting Clip from rear of Panel.
3. Snap Retaining Ring over Mounting Clip from rear.



3mm LED
High Efficiency Bi-Color
Diffused

Dialight

3BD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
3BD-9459	Red/Green
3BD-9478	Yellow/Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

4

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9459	-9478
Power dissipation (mW)	140	140
Forward Current (mA) Derating (mA/°C)[1]	40 0.6	40 0.6
Peak Current (mA) *Pulse width = 10µs*	500	500
Operating Temperature (°C)	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 25°C

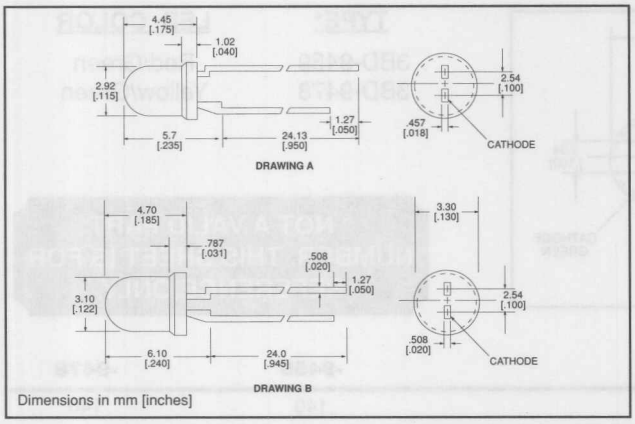
OPERATING CHARACTERISTICS (T_A=25°C)		-9459	-9478
Luminous intensity (mcd) I_F=10mA	Min. Typical	2.5 5.0	2.5 5.0
Dominant Wavelength (nm) λ Dom.	Typical	628/570	590/570
Peak Wavelength (nm) λ Peak	Typical	635/565	585/565
Viewing Angle	Typical	±25°	±30°
Forward Voltage (V) I_F=10mA	Typical Max.	2.0 2.6	2.0 2.6

Note: Data shown as Red/Green or Yellow/Green as applicable.

3mm LED
High Efficiency
Diffused

Dialight

3HD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR	DRAWING
3HD-9211	Yellow	A
3HD-9340	Red	A
3HD-9356	Green	A
3HD-9408	Green	B
3HD-9427	Red	B
3HD-9428	Yellow	B

Drawing A devices for 564 and all DIN 41494 compatible 551 and 553 products.

Drawing B devices for 553 and 551 excluding DIN compatible types.

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9211	-9340	-9356	-9408	-9427	-9428
Power dissipation (mW)	85	135	135	75	60	60
Derating (mW/°C)	1.6[1]	1.8[1]	1.8[1]			
Forward Current (mA)	20	30	25	25	20	20
Derating (mA/°C)				0.5[2]	0.5[2]	0.5[2]
Peak Current (mA) *Pulse width = 10 µs*	90	90	90	60	60	60
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100	-25/+85	-25/+85	-25/+85
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100	-30/+100	-30/+100	-30/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

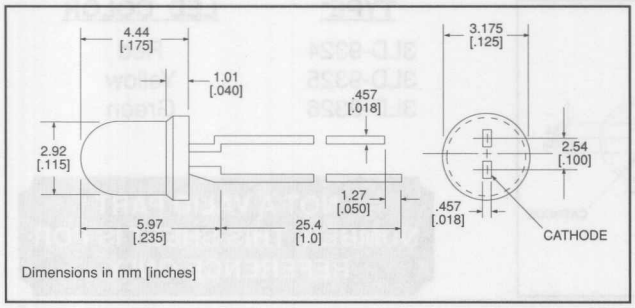
1. From 25°C 2. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9211	-9340	-9356	-9408	-9427	-9428
Luminous intensity (mcd)	Min.	6.0	6.0	4.0	5.6	3.6	2.2
I_F=10mA	Typical	10	10	8.5	16	10	6.3
Dominant Wavelength (nm) λ Dom.	Typical	585	626	569	569	630	585
Peak Wavelength (nm) λ Peak	Typical	583	635	565	563	650	583
Viewing Angle	Typical	±30°	±30°	±30°	±22.5°	±22.5°	±22.5°
Forward Voltage (V)	Typical	2.2	2.2	2.3	2.1	2.0	2.1
I_F=10mA	Max.	3.0	3.0	3.0	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5	5	5	3*	3*	3*
* I_R=10µA							

3mm LED
High Efficiency
Tinted, Non-Diffused

Dialight

3HN-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
3HN-9430	Green
3HN-9431	Yellow
3HN-9432	Red

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

4

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9430	-9431	-9432
Power Dissipation (mW)	135	85	135
Derating (mW/°C)	1.8[1]	1.6[1]	1.8[1]
Forward Current (mA)	30	20	30
Peak Current (mA) *Pulse width = 10µs*	500	500	500
Operating Temperature (°C) •	-20/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

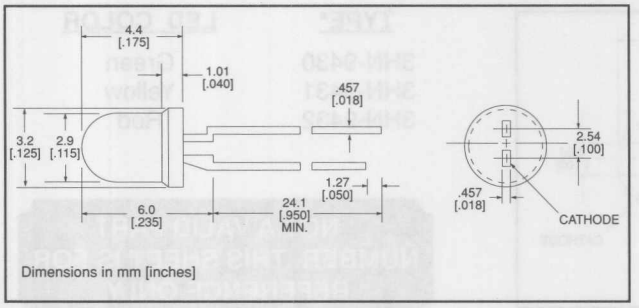
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9430	-9431	-9432
Luminous intensity (mcd)	Min.	4.2	6.0	8.6
I_F=10mA	Typical	12	12	12
Dominant Wavelength (nm) λ Dom.	Typical	569	585	626
Peak Wavelength (nm) λ Peak	Typical	565	583	635
Viewing Angle	Typical	±22.5°	±22.5°	±22.5°
Forward Voltage (V)	Typical	2.3	2.2	2.2
I_F=10mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

3mm
Low Current
Tinted, Diffused

Dialight

3LD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
3LD-9324	Red
3LD-9325	Yellow
3LD-9326	Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9324	-9325	-9326
Power dissipation (mW)	24	36	24
Forward Current (mA)	7	7	7
Derating (mA/°C)	1.0[1]	1.0[1]	1.0[1]
Peak Current (mA) *Pulse width = 10 µs*	500	500	500
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

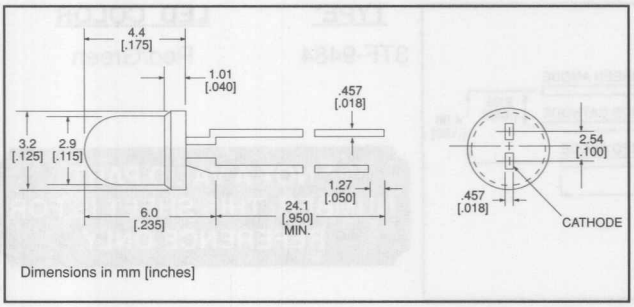
1. From 92°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9324	-9325	-9326
Luminous intensity (mcd)	Min.	1.0	1.0	1.0
I_F=2mA	Typical	1.8	1.6	1.6
Dominant Wavelength (nm) λ Dom.	Typical	626	598	569
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±25°	±25°	±25°
Forward Voltage (V)	Typical	1.8	1.9	1.8
I_F=2mA	Max.	2.2	2.7	2.2
Reverse Voltage (V), I_R=50µA	Min.	5.0	5.0	5.0

3mm
Integral Resistor, 5V
Tinted, Diffused

Dialight

3RD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
3RD-9322	Yellow
3RD-9323	Green
3RD-9405	Red

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

4

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9322	-9323	-9405
Forward Voltage (V)	7.5	7.5	7.5
Derating (V/°C)	.071[1]	.071[1]	.071[1]
Operating Temperature (°C)	-40/+85	-20/+100	-40/+85
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

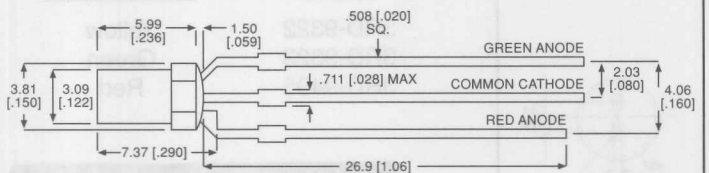
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9322	-9323	-9405
Luminous intensity (mcd)	Min.	2.0	2.0	1.5
V_F=5V	Typical	8.0	8.0	4.0
Dominant Wavelength (nm) λ Dom.	Typical	585	569	626
Peak Wavelength (nm) λ Peak	Typical	583	565	635
Viewing Angle	Typical	±30°	±30°	±30°
Forward Current (mA)	Typical	10	12	10
V_F=5V	Max.	15	15	15
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

3mm Flat Top
3 Leaded Bi-Color LED
Non-Tinted, Diffused

Dialight

3TF-XXXX



Dimensions in mm [inches]

TYPE*	LED COLOR
3TF-9484	Red/Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9484
Power dissipation (mW)	75
Forward Current (mA) Derating (mA/°C)	30 .33/.67[1]
Peak Current (mA) *Pulse width = 10 µs*	100
Operating Temperature (°C)	-30/+85
Storage Temperature (°C)	-30/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

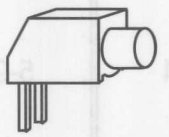
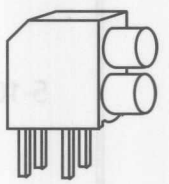
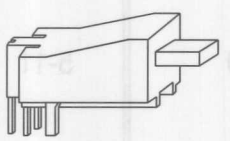
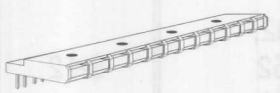
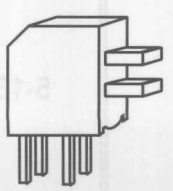
1. Red/Green from 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9484
Luminous intensity (mcd) I_F=20mA	Min. Typical	2 4
Peak Wavelength (nm) λ Peak	Typical	630/560
Viewing Angle	Typical	±50°
Forward Voltage (V) I_F=20mA	Typical Max.	2.0/2.1 2.5
Reverse Voltage (V), I_R=30µA	Min.	4.0

Note: Data shown as Red/Green as applicable.

Selector Guide:

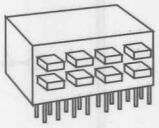
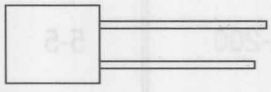
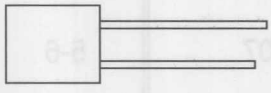
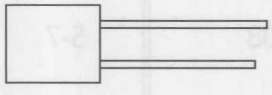
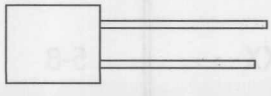
4mm & Rectangular LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	4mm LED CBI	550-6X07	5-4
	4mm Bilevel LED CBI	552-60XX-200	5-5
	2mm x 5mm Rectangular LED CBI	566-XX07	5-6
	2mm x 5mm Rectangular LED CBI Array	566-0408	5-7
	2mm x 4mm Rectangular LED CBI	567-01XX	5-8

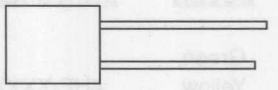
5

Selector Guide:

4mm & Rectangular LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	2mm x 4mm Quad Bilevel LED CBI Array	567-01XX-004	5-9
	2mm x 4mm Rectangular LED	521-9606, 521-9607, 521-9658	5-10
	2mm x 4mm Rectangular Bicolor LED	521-9640	5-11
	2mm x 5mm Rectangular LED	521-9332, 521-9452 521-9499	5-12
	2mm x 5mm Rectangular Bicolor LED	521-9406	5-13

Selector Guide:
4mm & Rectangular LED Products

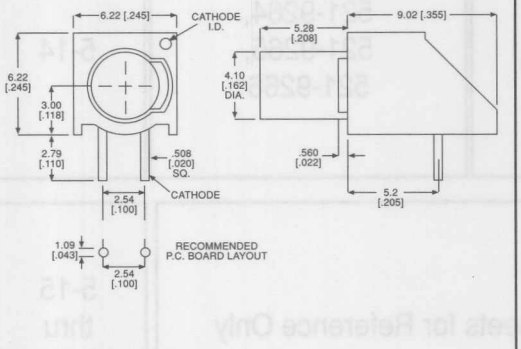
	DESCRIPTION	DATA SHEET	PAGE(s)
	2mm x 7mm Rectangular LED	521-9264, 521-9265, 521-9266	5-14
Backup 4mm & Rectangular LED Data Sheets for Reference Only			5-15 thru 5-20

5

4mm, Flat Top
LED CBI® Circuit Board Indicator
Sloped Back Housing

Dialight

550-6x07



Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
550-6207	Green	
550-6307	Yellow	4HF-XXXX
550-6407	Red	

Benefits

- Flat top LED for flush panel appearance
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

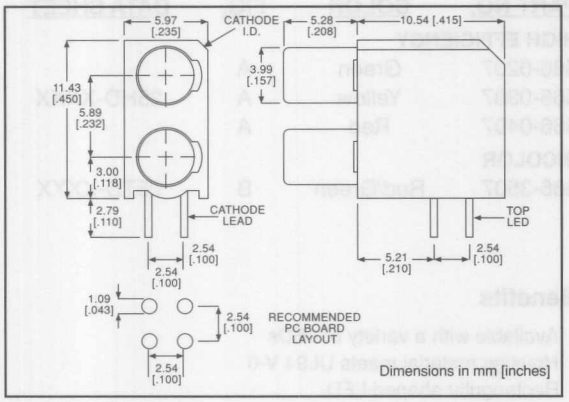
Typical Operating Characteristics @ T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-6207	Green	565	10	2.3	20	±67.5	4HF-XXXX
550-6307	Yellow	583	7.0	2.2	20	±67.5	
550-6407	Red	635	7.0	2.2	20	±67.5	

4mm, Flat Top
LED CBI® Circuit Board Indicator
Bi-level

Dialight

552-60xx-200



PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY		
552-6011-200	Red/Red	
552-6022-200	Green/Green	
552-6023-200	Green/Yellow	4HF-xxxx
552-6032-200	Yellow/Green	
552-6033-200	Yellow/Yellow	

* Top/Bottom LED

5

Benefits

- Flat top design for flush panel appearance
- Bi-level design conserves board space
- Single insertion of 2 LEDs
- Black case enhances contrast
- Housing material meets UL 94V-0
- High reliability - life measured in years
- Housing assures proper LED alignment
- Standoffs on housing facilitate P.C. board cleaning
- Vibration and shock resistant

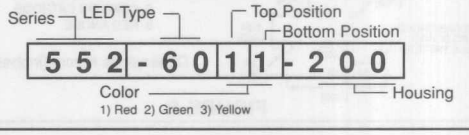
Custom Combinations

- Contact factory for information on custom color combinations.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

EXAMPLE OF PART NUMBER ORDERING CODE



Typical Operating Characteristics @ T_A=25°C

Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
Red	635	7	2.2	20	±67.5	4HF-xxxx
Green	565	10	2.3	20	±67.5	
Yellow	583	7	2.2	20	±67.5	

2mm x 5mm Rectangular
LED CBI® Circuit Board Indicator

Dialight

566-xx07

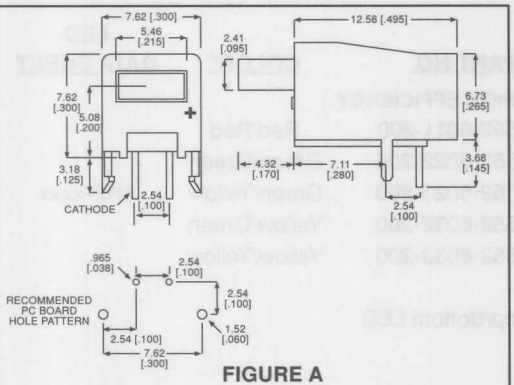


FIGURE A

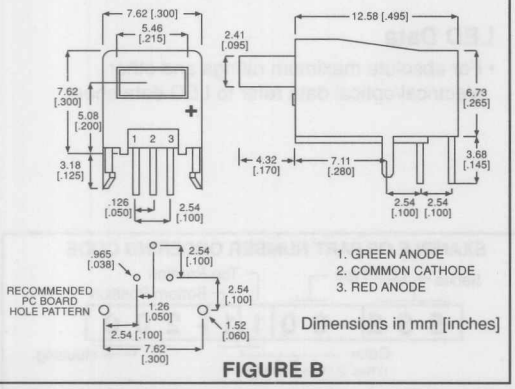


FIGURE B

PART NO.	COLOR	FIG.	LED DATA SHEET
HIGH EFFICIENCY			
566-0207	Green	A	
566-0307	Yellow	A	25HD-XXXX
566-0407	Red	A	
BICOLOR			
566-3507	Red/Green	B	25TD-XXXX

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Rectangular shaped LED
- 3 leaded bicolor simplifies drive circuit
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Snap in housing assures positive placement
- Standoffs on housing facilitate PC board cleaning

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
566-0207	Green	565	4.0	2.3	20	±55	
566-0307	Yellow	583	3.5	2.2	20	±55	25HD-XXXX
566-0407	Red	635	6.0	2.0	20	±55	

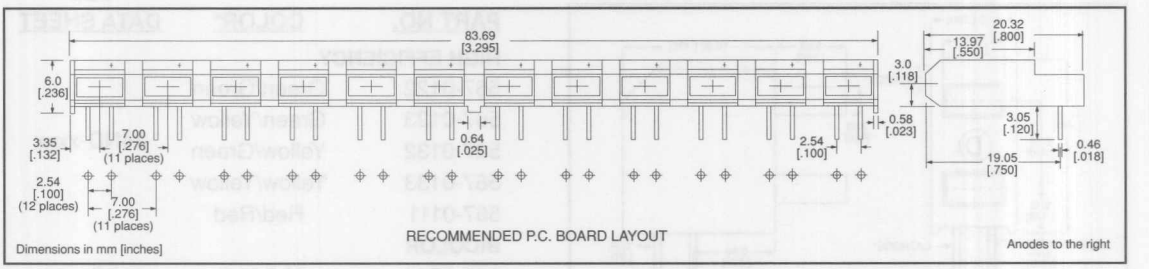
BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts*	Test Current (mA)	Viewing Angle	LED Data sheet
566-3507	Red/Green	635/565	3.5/4.0	2.1/2.3	20	±55	25TD-XXXX

2mm x 5mm Rectangular LED CBI® Circuit Board Indicator 12 LED Array

Dialight

566-0408



PART NO	COLOR	LED DATA SHEET
HIGH EFFICIENCY		
566-0408	Red	25HD-XXXX

5

Benefits

- 2mm x 5mm LED for low profile appearance
- Single PC board insertion of 12 LEDs
- Housing material meets UL94V-0
- Housing assures proper LED alignment
- Stand offs on housing facilitate PC board cleaning
- Vibration and shock resistant
- Black case enhances contrast ratio

Custom Combinations

- For custom color combinations contact factory

LED Data

- For absolute maximum ratings and other optical/electrical data refer to the LED Data Sheets

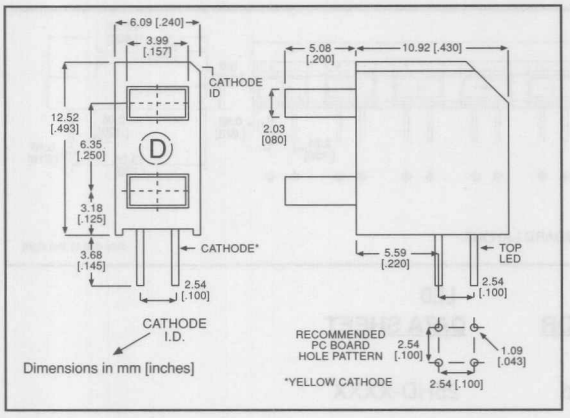
TYPICAL OPERATING CHARACTERISTICS @T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
566-0408	Red	635	6	2.0	20	±55	25HD-xxxx

2mm x 4mm Rectangular LED CBI® Circuit Board Indicator Bi-level

Dialight

567-01xx



PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY		
567-0122	Green/Green	24ND-xxxx
567-0123	Green/Yellow	
567-0132	Yellow/Green	
567-0133	Yellow/Yellow	
567-0111	Red/Red	
BICOLOR		
567-0744	Y•G/Y•G	24BD-xxxx

*Top/Bottom LED

Benefits

- 2mm x 4mm LED
- Bi-level design conserves board space
- Housing material meets UL 94V-0
- Black case enhances contrast
- Housing assures proper LED alignment
- Standoffs on housing facilitate P.C. board cleaning
- Vibration and shock resistant
- Single PC Board insertion 2 LEDs
- 2 x 4 LED array version available

Custom Combination

- Contact factory for information on custom color combinations and multiple LED arrays

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

EXAMPLE OF PART NUMBER ORDERING CODE

Series — LED Type — Top LED Color

5 6 7 - 0 1 2 3 — Bottom LED Color

LED colors: 1) Red 2) Green 3) Yellow

Typical Operating Characteristics @ T_A=25°C

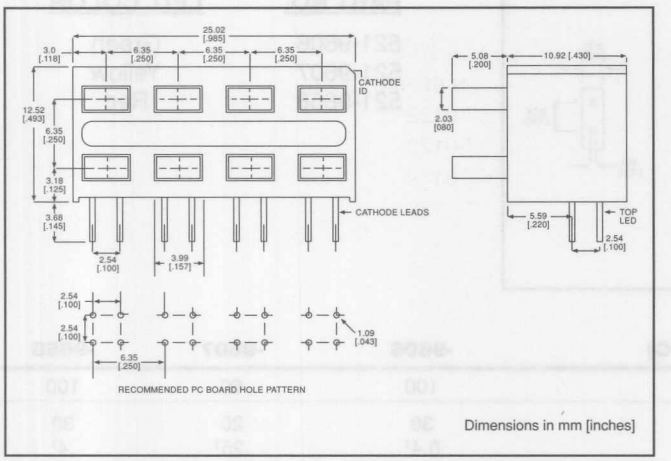
Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
Green	565	3.0*	2.1	20	±52°	24ND-xxxx
Yellow	585	3.0*	2.1	20	±52°	24ND-xxxx
Red	635	3.0*	2.1	20	±52°	24ND-xxxx
Yellow/Green	585/565	3.0/3.0	2.1/2.1	20	±52°	24BD-xxxx

*I_V measured at 10 mA

2mm x 4mm Rectangular
LED CBI® Circuit Board Indicator
Quad Bi-level Array

Dialight

567-01xx-004



PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY		
567-0122-004	G/G	24ND-xxxx
567-0123-004	G/Y	
567-0132-004	Y/G	
567-0133-004	Y/Y	
567-0111-004	R/R	

*Top/Bottom row of LEDs

5

Benefits

- 2mm x 4mm LEDs
- Bi-level design conserves board space
- Housing material meets UL 94V-0
- Black case enhances contrast
- Housing assures proper LED alignment
- Standoffs on housing facilitate P.C. board cleaning
- Vibration and shock resistant
- Single insertion of 8 LEDs

Custom Combination

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

EXAMPLE OF PART NUMBER ORDERING CODE

Series | LED Type | Top LED Color

5 6 7 - 0 1 2 3 - 0 0 4

Bottom LED Color

LED colors: 1) Red 2) Green 3) Yellow

Typical Operating Characteristics @ T_A=25°C

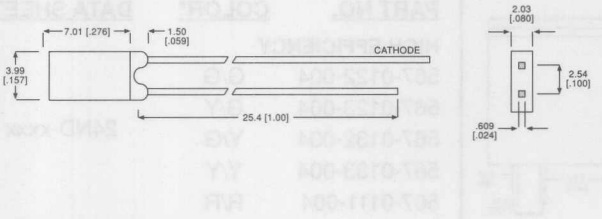
Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
Green	565	3.0*	2.1	20	±52°	24ND-xxxx
Yellow	585	3.0*	2.1	20	±52°	24ND-xxxx
Red	635	3.0	2.1	20	±52°	24ND-xxxx

*I_V measured at 10 mA

2mm x 4mm Discrete LED
Standard Efficiency
Tinted, Diffused

Dialight

521-9606, 9607, 9658



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9606	Green
521-9607	Yellow
521-9658	Red

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9606	-9607	-9658
Power dissipation (mW)	100	60	100
Forward Current (mA)	30	20	30
Derating (mA/°C)	0.4[1]	.25[1]	.4[1]
Peak Current (mA) *Pulse width = 100 µs*	120	80	120
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

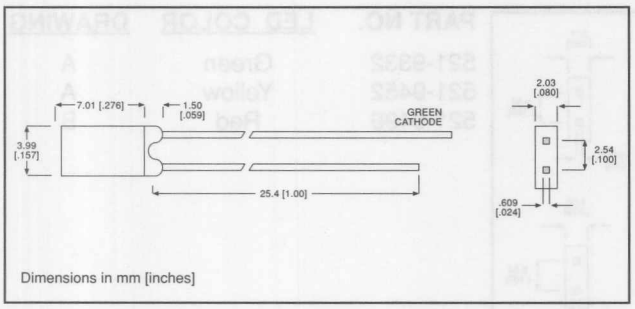
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9606	-9607	-9658
Luminous intensity (mcd)	Min.	1.5	1.5	1.5
I_F=10mA	Typical	3.7	2.5	3.7
Peak Wavelength (nm) λ Peak	Typical	565	585	635
Viewing Angle	Typical	±52°	±52°	±52°
Forward Voltage (V)	Typical	2.1	2.1	2.0
I_F=20mA	Max.	2.8	2.8	2.8
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

2mm x 4mm Discrete LED
Standard Efficiency - Bicolor
Diffused

Dialight

521-9640



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9640	Y•G/Y•G

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	YELLOW	GREEN
Power dissipation (mW)	60	100
Forward Current (mA)	20	30
Derating (mA/°C)	.25[1]	.4[1]
Peak Current (mA) *Pulse width = 100 µs*	80	120
Operating Temperature (°C)	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 50°C

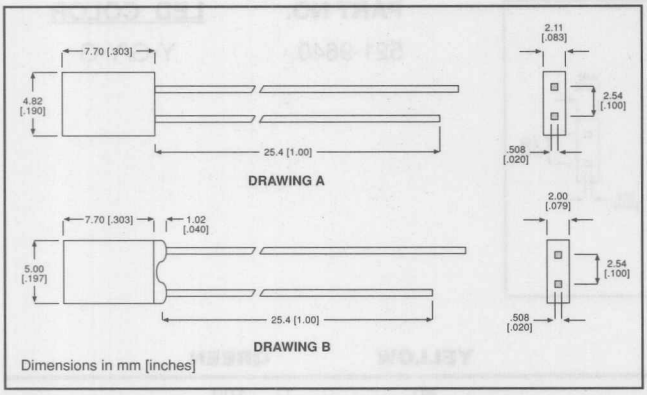
OPERATING CHARACTERISTICS (T_A=25°C)		YELLOW	GREEN
Luminous intensity (mcd)	Min.	0.7	1.1
I_F=20mA	Typical	2.5	3.7
Peak Wavelength (nm) λ Peak	Typical	585	565
Viewing Angle	Typical	±70°	±70°
Forward Voltage (V)	Typical	2.1	2.1
I_F=20mA	Max.	2.8	2.8
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0

5

2mm x 5mm Discrete LED
High Efficiency
Tinted, Diffused

Dialight

521-9332, -9452, -9499



Dimensions in mm [inches]

PART NO.	LED COLOR	DRAWING
521-9332	Green	A
521-9452	Yellow	A
521-9499	Red	B

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9332	-9452	-9499
Power dissipation (mW)	135	85	60
Forward Current (mA)	30	20	20
Derating (mA/°C)	0.5[1]	.34[1]	.33[2]
Peak Current (mA) *Pulse width = 1 µs*	90	90	90
Operating Temperature (°C)	-20/+85	-55/+100	-20/+85
Storage Temperature (°C)	-55/+100	-55/+100	-30/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

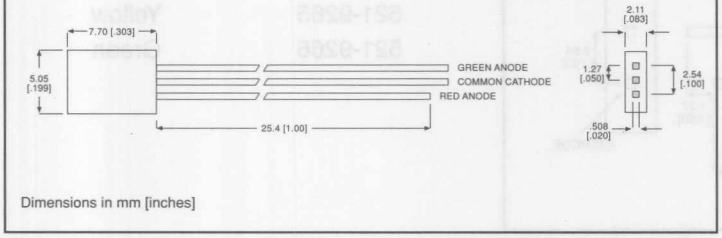
1. From 50°C 2. From 40°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9332	-9452	-9499
Luminous intensity (mcd)	Min.	2.6	2.2	3.0
I_F=20mA	Typical	4.0	3.5	6.0
Dominant Wavelength λ Dom.	Typical	569	585	626
Peak Wavelength (nm) λ Peak	Typical	565	583	635
Viewing Angle	Typical	±55°	±55°	±55°
Forward Voltage (V)	Typical	2.3	2.2	2.0
I_F=20mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	3.0*
I_R=10µA				

2mm x 5mm Discrete LED
3 Leaded Bi-Color LED
Non-Tinted, Diffused

Dialight

521-9406



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9406	Red/Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9406
Power dissipation (mW)	135
Derating (mW/°C)	1.8[1]
Forward Current (mA)	25
Peak Current (mA) *Pulse width = 10 µs*	90
Operating Temperature (°C)	-20/+85
Storage Temperature (°C)	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9406
Luminous intensity (mcd) I_F=20mA	Min. Typical	2.1/2.6 3.5/4.0
Dominant Wavelength (nm) λ Dom.	Typical	626/569
Peak Wavelength (nm) λ Peak	Typical	635/565
Viewing Angle	Typical	±50°
Forward Voltage (V) I_F=10mA	Typical Max.	2.1/2.3 2.5/2.7
Reverse Voltage (V), I_R=100µA	Min.	5.0

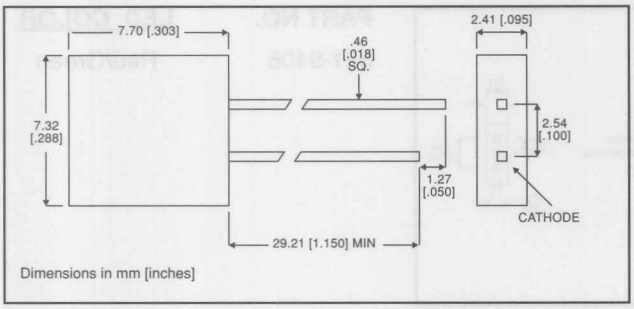
Note: Data shown as Red/Green as applicable.

5

2mm x 7mm Discrete LED
Rectangular
Tinted, Diffused

Dialight

521-9264, -9265, -9266



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9264	Red
521-9265	Yellow
521-9266	Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9264	-9265	-9266
Power dissipation (mW)	135	85	135
Derating (mW/°C)	1.8	1.61	1.8
Forward Current (mA)	30	20	30
Peak Current (mA) *Pulse width = 10μs*	500	500	500
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

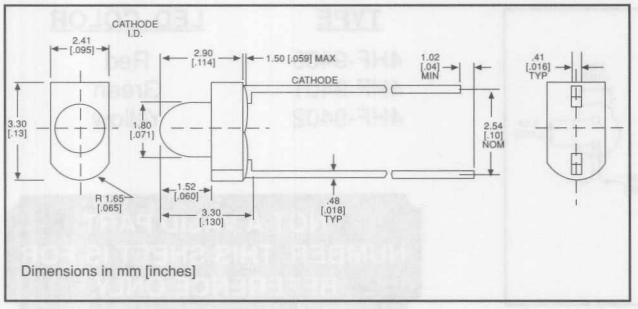
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9264	-9265	-9266
Luminous intensity (mcd)	Min.	2.5	3.0	1.5
I_F=20mA	Typical	5.0	5.0	2.5
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±50°	±50°	±50°
Forward Voltage (V)	Typical	2.2	2.2	2.3
I_F=20mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100μA	Min.	5.0	5.0	5.0

2mm
High Efficiency
Tinted, Diffused

Dialight

2HD-xxxx



Dimensions in mm [inches]

PART NO.	LED COLOR
2HD-9630	Red
2HD-9631	Yellow
2HD-9632	Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9630	-9631	-9632
Power dissipation (mW)	100	60	100
Forward Current (mA)	30	20	30
Derating 9mmA/°C)	0.4[1]	0.25[1]	0.4[1]
Peak Current (mA) *Pulse width = 10µs*	120	80	120
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 25°C

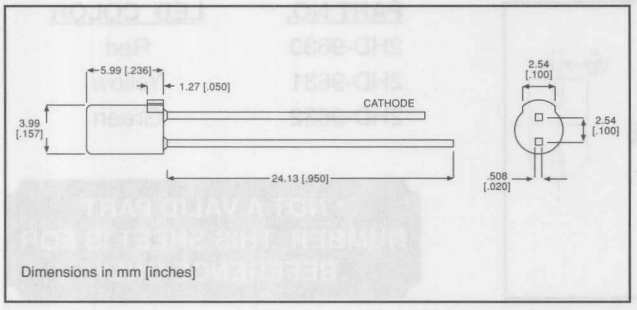
OPERATING CHARACTERISTICS (T_A=25°C)		-9630	-9631	-9632
Luminous intensity (mcd) I_F=20mA	Min. Typical	0.7 3.0	1.1 3.5	0.5 1.5
Peak Wavelength (nm) λ Peak	Typical	635	585	565
Viewing Angle	Typical	±38°	±38°	±38°
Forward Voltage (V) I_F=20mA	Typical Max.	2.0 2.8	2.1 2.8	2.1 2.8
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

5

4mm
High Efficiency Flat Top
Tinted, Diffused

Dialight

4HF-xxxx



Dimensions in mm [inches]

TYPE	LED COLOR
4HF-9400	Red
4HF-9401	Green
4HF-9402	Yellow

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9400	-9401	-9402
Power dissipation (mW)	135	135	85
Derating (mW/°C)	1.8[1]	1.8[1]	1.6[1]
Forward Current (mA)	25	25	20
Peak Current (mA) *Pulse width = 10 µs*	90	90	60
Operating Temperature (°C)	-55/+100	-20/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

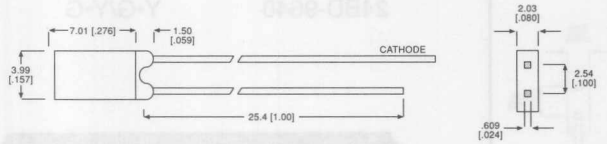
1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9400	-9401	-9402
Luminous intensity (mcd)	Min.	5.4	6.7	5.7
I_F=20mA	Typical	7.0	10	7.0
Peak Wavelength (nm) λ Peak	Typical	635	565	583
Viewing Angle	Typical	±67.5°	±67.5°	±67.5°
Forward Voltage (V)	Typical	2.2	2.3	2.2
I_F=20mA	Max.	3.0	3.0	3.0
Reverse Voltage (V) I_R=100µA	Typical	5.0	5.0	5.0

2mm x 4mm Rectangular LED
Standard Efficiency
Tinted, Diffused

Dialight

24ND-xxxx



Dimensions in mm [inches]

TYPE	LED COLOR
24ND-9606	Green
24ND-9607	Yellow
24ND-9658	Red

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9606	-9607	-9658
Power dissipation (mW)	100	60	100
Forward Current (mA) Derating (mA/°C)	30 0.4[1]	20 .25[1]	30 .4[1]
Peak Current (mA) *Pulse width = 100 µs*	120	80	120
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 50°C

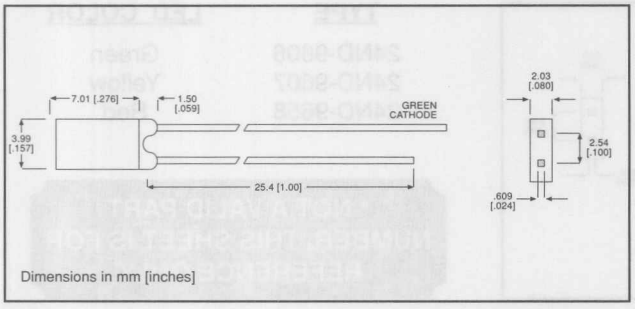
OPERATING CHARACTERISTICS (T_A=25°C)		-9606	-9607	-9658
Luminous intensity (mcd) I_F=10mA	Min. Typical	1.5 3.7	1.5 2.5	1.5 3.7
Peak Wavelength (nm) λ Peak	Typical	565	585	635
Viewing Angle	Typical	±52°	±52°	±52°
Forward Voltage (V) I_F=20mA	Typical Max.	2.1 2.8	2.1 2.8	2.0 2.8
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

5

2mm x 4mm Rectangular LED
Standard Efficiency - Bicolor
Diffused

Dialight

24BD-xxxx



Dimensions in mm [inches]

PART NO.	LED COLOR
24BD-9640	Y•G/Y•G

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	YELLOW	GREEN
Power dissipation (mW)	60	100
Forward Current (mA)	20	30
Derating (mA/°C)	.25[1]	.4[1]
Peak Current (mA) *Pulse width = 100 µs*	80	120
Operating Temperature (°C)	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100

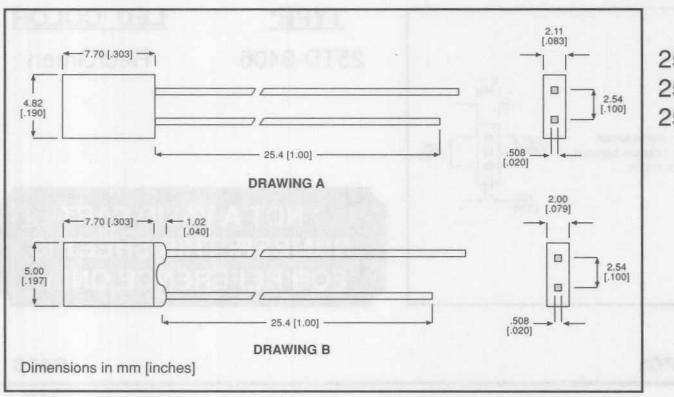
Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		YELLOW	GREEN
Luminous intensity (mcd)	Min.	.7	1.1
I_F=20mA	Typical	2.5	3.7
Peak Wavelength (nm) λ Peak	Typical	585	565
Viewing Angle	Typical	±52°	±52°
Forward Voltage (V)	Typical	2.1	2.1
I_F=20mA	Max.	2.8	2.8
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0

2mm x 5mm High Efficiency Tinted, Diffused

Dialight 25HD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR	DRAWING
25HD-9332	Green	A
25HD-9452	Yellow	A
25HD-9499	Red	B

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

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ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9332	-9452	-9499
Power dissipation (mW)	135	85	60
Forward Current (mA)	30	20	20
Derating (mA/°C)	0.5[1]	.34[1]	.33[2]
Peak Current (mA) *Pulse width = 1 µs*	90	90	90
Operating Temperature (°C)	-20/+85	-55/+100	-20/+85
Storage Temperature (°C)	-55/+100	-55/+100	-30/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

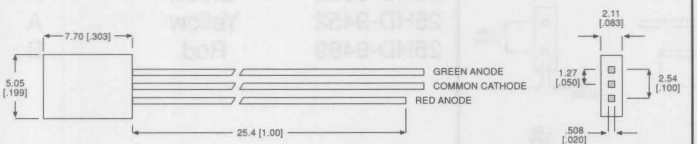
1. From 50°C 2. From 40°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9332	-9452	-9499
Luminous intensity (mcd)	Min.	2.6	2.2	3.0
I_F=20mA	Typical	4.0	3.5	6.0
Dominant Wavelength λ Dom.	Typical	569	585	626
Peak Wavelength (nm) λ Peak	Typical	565	583	635
Viewing Angle	Typical	±55°	±55°	±55°
Forward Voltage (V)	Typical	2.3	2.2	2.0
I_F=20mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	3.0*
I_R=10µA				

2mm x 5mm
3 Leaded Bi-Color LED
Non-Tinted, Diffused

Dialight

25TD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
25TD-9406	Red/Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9406
Power dissipation (mW)	135
Derating (mW/°C)	1.8[1]
Forward Current (mA)	25
Peak Current (mA) *Pulse width = 10 µs*	90
Operating Temperature (°C)	-20/+85
Storage Temperature (°C)	-55/+100

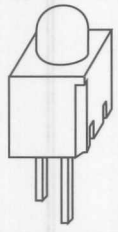
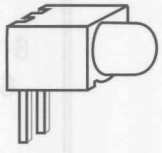
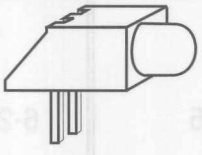
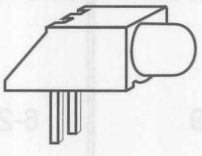
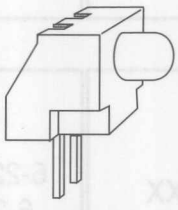
Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9406
Luminous intensity (mcd) I_F=20mA	Min. Typical	2.1/2.6 3.5/4.0
Dominant Wavelength (nm) λ Dom.	Typical	626/569
Peak Wavelength (nm) λ Peak	Typical	635/565
Viewing Angle	Typical	±50°
Forward Voltage (V) I_F=10mA	Typical Max.	2.1/2.3 2.5/2.7
Reverse Voltage (V), I_R=100µA	Min.	5.0

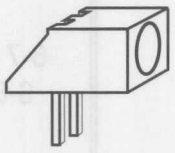
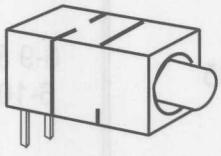
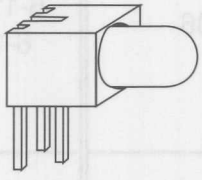
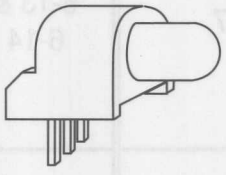
Note: Data shown as Red/Green as applicable.

Selector Guide:
5mm LED Products

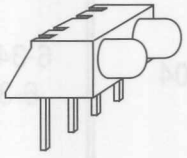
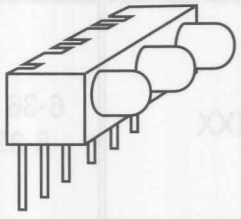
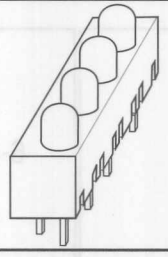
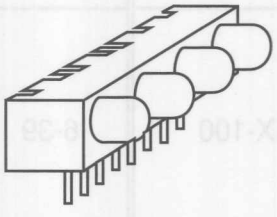
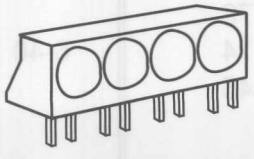
	DESCRIPTION	DATA SHEET	PAGE(s)
	5mm LED CBI	550-XX04	6-7 & 6-8
	5mm LED CBI	550-XX05	6-9 & 6-10
	5mm LED CBI (550-XX07 recommended for new designs)	550-XX06	6-11 & 6-12
	5mm LED CBI	550-XX07	6-13 & 6-14
	5mm LED CBI	550-XX08	6-15 & 6-16

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Selector Guide:
5mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	5mm LED CBI (Backlight)	550-XX10	6-17
	5mm LED CBI (DIN 41494 compatible)	550-XX12	6-18 & 6-19
	5mm 3-Leaded Bicolor LED CBI	550-3X05	6-20
	5mm 3-Leaded Bicolor LED CBI	550-3X09	6-21
	5mm LED CBI	561-XX0X-XXX	6-22 & 6-23

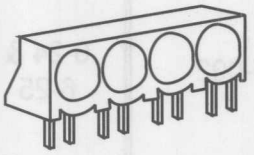
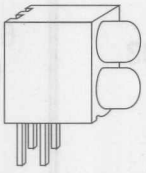
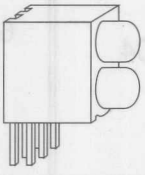
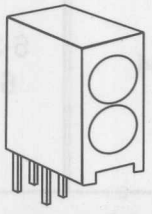
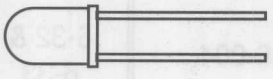
Selector Guide:
5mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	5mm Dual LED CBI	550-XX07-002	6-24 & 6-25
	5mm Triblock LED CBI	550XX05-003	6-26 & 6-27
	5mm Quad LED CBI	550-XX04-004	6-28 & 6-29
	5mm Quad LED CBI	550-XX05-004	6-30 & 6-31
	5mm Quad LED CBI (550-XX07-004 recommended for new designs)	550-XX06-004	6-32 & 6-33

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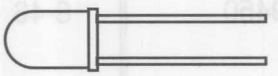
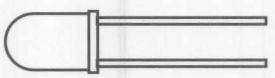
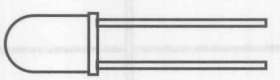
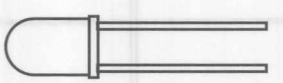
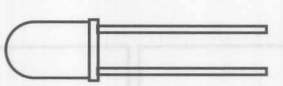
Selector Guide:

5mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	5mm Quad LED CBI	550-XX07-004	6-34 & 6-35
	5mm Bilevel LED CBI	552-0XXX	6-36 & 6-37
	5mm Bilevel LED CBI	552-35XX	6-38
	5mm Bilevel LED CBI (Backlight)	552-22XX-100	6-39
	5mm LED (High efficiency, Low profile)	521-9173 521-9174 521-9445	6-40

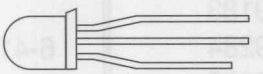
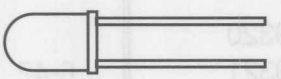
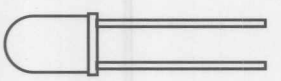
Selector Guide:

5mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	5mm LED (Integral resistor, 5V)	521-9183 521-9284 521-9285	6-41
	5mm LED (Low current, 2mA)	521-9320 521-9321 521-9327	6-42
	5mm LED (High efficiency)	521-9240	6-43
	5mm LED (High efficiency)	521-9246 521-9248 521-9250	6-44
	5mm LED (Tinted non-diffused)	521-9247, 521-9249 & 521-9251	6-45

6

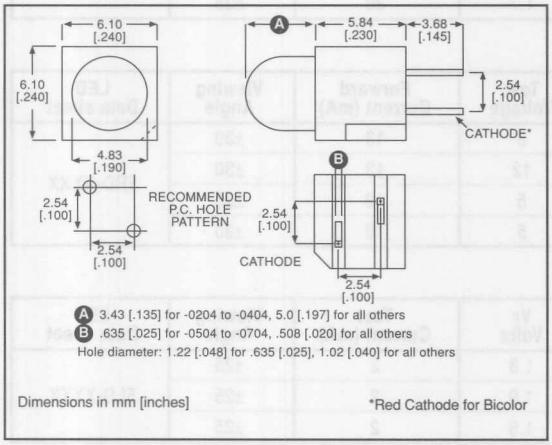
Selector Guide:
5mm LED Products

	DESCRIPTION	DATA SHEET	PAGE(s)
	5mm LED (Bicolor, red/green)	521-9450	6-46
	5mm LED (Bicolor, red/green)	521-9462	6-47
	5mm LED (Tinted non-diffused)	521-9464 521-9465 521-9466	6-48
	Snap-In LED Mounting Hardware	515-0004	6-49
	Snap-In LED Mounting Hardware	515-0005	6-50
Backup 5mm LED Data Sheets for Reference Only.			6-51 thru 6-59

5mm
LED CBI® Circuit Board Indicator
Top View, Single

Dialight

550-xx04



A 3.43 [.135] for -0204 to -0404, 5.0 [.197] for all others
B .635 [.025] for -0504 to -0704, .508 [.020] for all others
Hole diameter: 1.22 [.048] for .635 [.025], 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0204	Green	
550-0304	Yellow	5ND-XXXX
550-0404	Red	
INTEGRAL RESISTOR		
550-0504	Red, 5V	
550-0604	Red, 12V	5RD-XXXX
550-0704	Green, 5V	
550-0804	Yellow, 5V	
LOW CURRENT, 2mA		
550-1104	Red	
550-1204	Yellow	5LD-XXXX
550-1304	Green	
HIGH EFFICIENCY		
550-2204	Green	
550-2304	Yellow	5HD-XXXX
550-2404	Red	
BICOLOR		
550-3004	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5104	Red	
550-5204	Green	5SD-XXXX
550-5304	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5504	Red	
550-5604	Green	5SW-XXXX
550-5704	Yellow	

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Compatible with 550-xx04-004 quad block

Custom

- For custom LEDs contact factory.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

6

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0204	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0304	Yellow	590	3.2	2.3	20	±35	
550-0404	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0504	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0604	Red, 12V	655	2.0	12	13	±30	
550-0704	Green, 5V	565	8.0	5	12	±30	
550-0804	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1104	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1204	Yellow	583	1.8	1.9	2	±25	
550-1304	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2204	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2304	Yellow	585	6.3	2.1	10	±25	
550-2404	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3004	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5104	Red	650	34	2.1	20	±25	5SD-XXXX
550-5204	Green	563	34	2.1	20	±25	
550-5304	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5504	Red	635	125	2.2	20	±12	5SW-XXXX
550-5604	Green	565	120	2.3	20	±12	
550-5704	Yellow	583	140	2.2	20	±12	

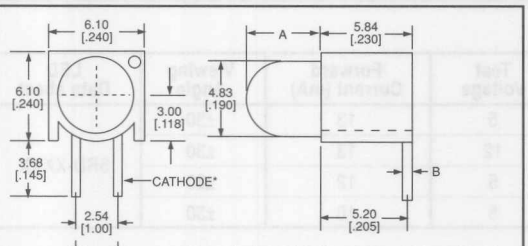
Note: See LED Data Sheet for additional information.

Dialight

5mm
LED CBI® Circuit Board Indicator
Square Back Housing

Dialight

550-xx05



Dimension A: 3.43 [.135] for -0205 to -0405, 5.0 [.197] for all others
Dimension B: .635 [.025] for -0505 to -0705, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Compatible with 550-xx05 tri and quad blocks

Custom

- For custom LEDs contact factory.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0205	Green	
550-0305	Yellow	5ND-XXXX
550-0405	Red	
INTEGRAL RESISTOR		
550-0505	Red, 5V	
550-0605	Red, 12V	5RD-XXXX
550-0705	Green, 5V	
550-0805	Yellow, 5V	
LOW CURRENT, 2mA		
550-1105	Red	
550-1205	Yellow	5LD-XXXX
550-1305	Green	
HIGH EFFICIENCY		
550-2205	Green	
550-2305	Yellow	5HD-XXXX
550-2405	Red	
BICOLOR		
550-3005	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5105	Red	
550-5205	Green	5SD-XXXX
550-5305	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5505	Red	
550-5605	Green	5SW-XXXX
550-5705	Yellow	

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0205	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0305	Yellow	590	3.2	2.3	20	±35	
550-0405	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0505	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0605	Red, 12V	655	2.0	12	13	±30	
550-0705	Green, 5V	565	8.0	5	12	±30	
550-0805	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1105	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1205	Yellow	583	1.8	1.9	2	±25	
550-1305	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2205	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2305	Yellow	585	6.3	2.1	10	±25	
550-2405	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3005	Red/Green	660/565	16	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5105	Red	650	34	2.1	20	±25	5SD-XXXX
550-5205	Green	563	34	2.1	20	±25	
550-5305	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5505	Red	635	125	2.2	20	±12	5SW-XXXX
550-5605	Green	565	120	2.3	20	±12	
550-5705	Yellow	583	140	2.2	20	±12	

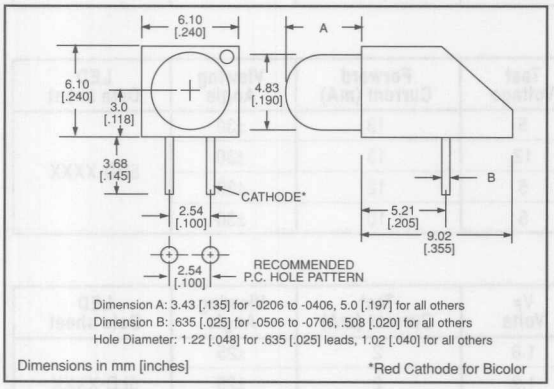
Note: See LED Data Sheet for additional information.

Dialight

5mm
LED CBI® Circuit Board Indicator
Sloped Back Housing

Dialight

550-xx06



Dimension A: 3.43 [.135] for -0206 to -0406, 5.0 [.197] for all others
Dimension B: .635 [.025] for -0506 to -0706, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment

Custom

- For custom LEDs contact factory.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

(NOTE: 550-xx07 (pg. 6-41) includes standoffs and is recommended for replacement and new designs)

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0206	Green	
550-0306	Yellow	5ND-XXXX
550-0406	Red	
INTEGRAL RESISTOR		
550-0506	Red, 5V	
550-0606	Red, 12V	5RD-XXXX
550-0706	Green, 5V	
550-0806	Yellow, 5V	
LOW CURRENT, 2mA		
550-1106	Red	
550-1206	Yellow	5LD-XXXX
550-1306	Green	
HIGH EFFICIENCY		
550-2206	Green	
550-2306	Yellow	5HD-XXXX
550-2406	Red	
BICOLOR		
550-3006	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5106	Red	
550-5206	Green	5SD-XXXX
550-5306	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5506	Red	
550-5606	Green	5SW-XXXX
550-5706	Yellow	

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0206	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0306	Yellow	590	3.2	2.3	20	±35	
550-0406	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	Iv mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0506	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0606	Red, 12V	655	2.0	12	13	±30	
550-0706	Green, 5V	565	8.0	5	12	±30	
550-0806	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1106	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1206	Yellow	583	1.8	1.9	2	±25	
550-1306	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2206	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2306	Yellow	585	6.3	2.1	10	±25	
550-2406	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3006	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5106	Red	650	34	2.1	20	±25	5SD-XXXX
550-5206	Green	563	34	2.1	20	±25	
550-5306	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

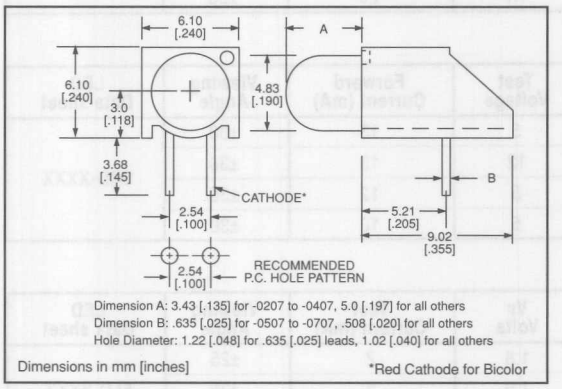
Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5506	Red	635	125	2.2	20	±12	5SW-XXXX
550-5606	Green	565	120	2.3	20	±12	
550-5706	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Sloped Back Housing with Standoffs

Dialight

550-xx07



Dimension A: 3.43 [.135] for -0207 to -0407, 5.0 [.197] for all others
Dimension B: .635 [.025] for -0507 to -0707, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning

Custom

- For custom LEDs contact factory.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0207	Green	
550-0307	Yellow	5ND-XXXX
550-0407	Red	
INTEGRAL RESISTOR		
550-0507	Red, 5V	
550-0607	Red, 12V	5RD-XXXX
550-0707	Green, 5V	
550-0807	Yellow, 5V	
LOW CURRENT, 2mA		
550-1107	Red	
550-1207	Yellow	5LD-XXXX
550-1307	Green	
HIGH EFFICIENCY		
550-2207	Green	
550-2307	Yellow	5HD-XXXX
550-2407	Red	
BICOLOR		
550-3007	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5107	Red	
550-5207	Green	5SD-XXXX
550-5307	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5507	Red	
550-5607	Green	5SW-XXXX
550-5707	Yellow	

6

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0207	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0307	Yellow	590	3.2	2.3	20	±35	
550-0407	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0507	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0607	Red, 12V	655	2.0	12	13	±30	
550-0707	Green, 5V	565	8.0	5	12	±30	
550-0807	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1107	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1207	Yellow	583	1.8	1.9	2	±25	
550-1307	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2207	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2307	Yellow	585	6.3	2.1	10	±25	
550-2407	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3007	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5107	Red	650	34	2.1	20	±25	5SD-XXXX
550-5207	Green	563	34	2.1	20	±25	
550-5307	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

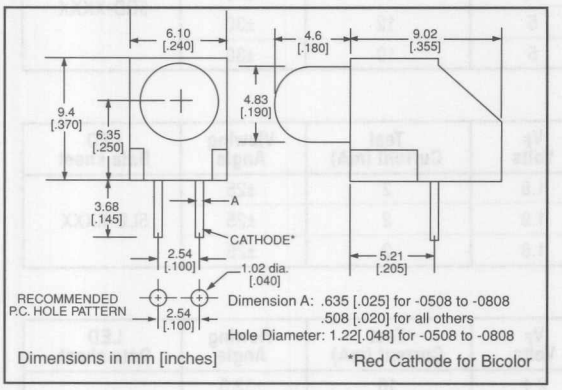
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5507	Red	635	125	2.2	20	±12	5SW-XXXX
550-5607	Green	565	120	2.3	20	±12	
550-5707	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
.250" LED Centerline

Dialight

550-xx08



Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment

Custom

- For custom LEDs contact factory.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

PART NO.	COLOR	LED DATA SHEET
INTEGRAL RESISTOR		
550-0508	Red, 5V	5RD-XXXX
550-0608	Red, 12V	
550-0708	Green, 5V	
550-0808	Yellow, 5V	
LOW CURRENT, 2mA		
550-1108	Red	5LD-XXXX
550-1208	Yellow	
550-1308	Green	
HIGH EFFICIENCY		
550-2208	Green	5HD-XXXX
550-2308	Yellow	
550-2408	Red	
BICOLOR		
550-3008	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5108	Red	5SD-XXXX
550-5208	Green	
550-5308	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5508	Red	5SW-XXXX
550-5608	Green	
550-5708	Yellow	

Typical Operating Characteristics @ T_A=25°C

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0508	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0608	Red, 12V	655	2.0	12	13	±30	
550-0708	Green, 5V	565	8.0	5	12	±30	
550-0808	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1108	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1208	Yellow	583	1.8	1.9	2	±25	
550-1308	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2208	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2308	Yellow	585	6.3	2.1	10	±25	
550-2408	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3008	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5108	Red	650	34	2.1	20	±25	5SD-XXXX
550-5208	Green	563	34	2.1	20	±25	
550-5308	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

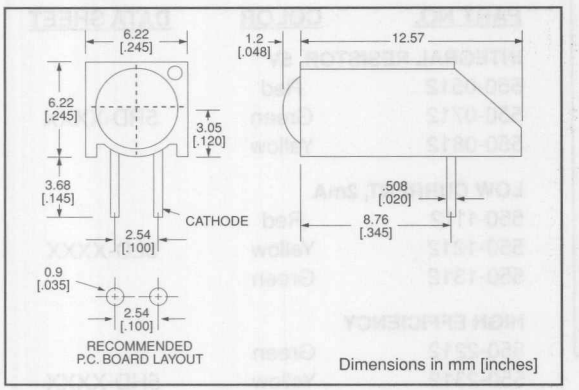
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5508	Red	635	125	2.2	20	±12	5SW-XXXX
550-5608	Green	565	120	2.3	20	±12	
550-5708	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
For Backlighting

Dialight

550-xx10

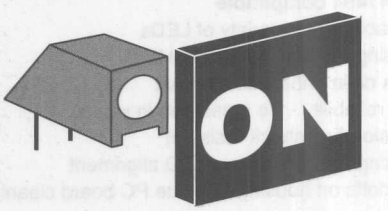


PART NO.	COLOR	LED DATA SHEET
HIGH EFFICIENCY, TINTED, NON DIFFUSED		
550-1510	Green	
550-1610	Yellow	5HN-XXXX
550-1710	Red	

Benefits

- High efficiency tinted, non-diffused LEDs
- Extended housing eliminates light bleed
- Narrow viewing angle
- High reliability - life measured in years
- Housing material meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment

TYPICAL BACKLIGHT APPLICATION



6

DIALIGHT'S EXTENDED HOUSING BACKLIGHTING PRODUCTS

This new family of products was designed specifically for backlight applications. Typical concerns when backlighting are brightness and control of adjacent LED bleed of color. This new family addresses both of these issues. First, the housing is extended around the LED, thus reducing bleed. Secondly, all of the extended housing family products are produced with tinted non-diffused LEDs. These have a narrow viewing angle. This further reduces bleed and results in a high intensity on axis light source.

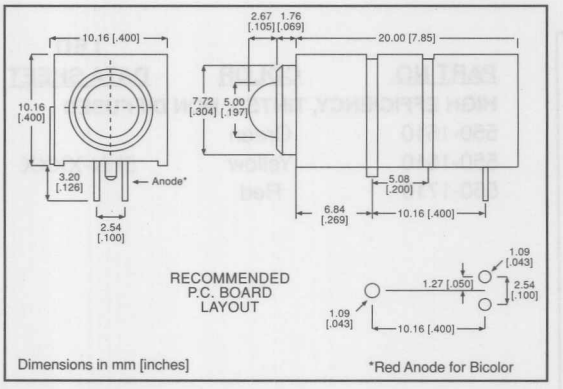
Typical Operating Characteristics @ T_A=25°C

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1510	Green	565	110	2.2	20	±15	5HN-XXXX
550-1610	Yellow	585	110	2.2	20	±15	
550-1710	Red	650	110	2.2	20	±15	

5mm
LED CBI® Circuit Board Indicator (DIN 41494 Compatible), Single

Dialight

550-xx12



PART NO.	COLOR	LED DATA SHEET
INTEGRAL RESISTOR, 5V		
550-0512	Red	
550-0712	Green	5RD-XXXX
550-0812	Yellow	
LOW CURRENT, 2mA		
550-1112	Red	
550-1212	Yellow	5LD-XXXX
550-1312	Green	
HIGH EFFICIENCY		
550-2212	Green	
550-2312	Yellow	5HD-XXXX
550-2412	Red	
BICOLOR		
550-3012	Red/Green	5BD-XXXX

Benefits

- **DIN 41494 compatible**
- Available with a variety of LEDs
- Housing material meets UL94V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning

Custom

- For custom LEDs contact factory.

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

550-xx12
(DIN 41494 Compatible)

Typical Operating Characteristics @ T_A=25°C

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0512	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0712	Green, 5V	565	8.0	5	12	±30	
550-0812	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1112	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1212	Yellow	583	1.8	1.9	2	±25	
550-1312	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2212	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2312	Yellow	585	6.3	2.1	10	±25	
550-2412	Red	650	7.0	2.2	10	±25	

BICOLOR

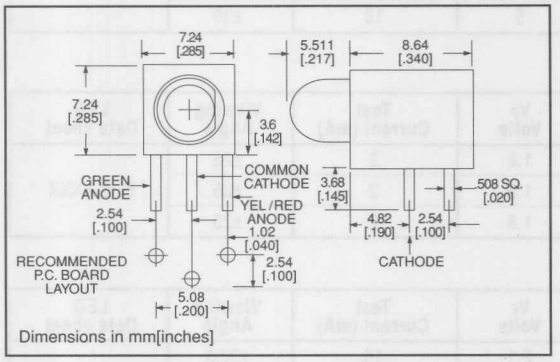
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3012	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
3 Leaded, Bicolor, Offset Cathode

Dialight

550-3x05



PART NO.	COLOR	LED DATA SHEET
550-3505	Red/Green	5TD-XXXX
550-3605	Yellow/Green	

Benefits

- Bi-color design conserves board space
- 3 leaded design simplifies drive circuitry
- Black case enhances contrast
- Housing material UL94V-O rated
- Housing assures proper LED Alignment
- Vibration and shock resistant
- High reliability - life measured in years

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

Application of Bicolor LEDs

A bicolor LED can produce a wide variety of colors in the range between the 2 colors. This function is achieved by varying the bias current or duty cycle that is applied to the device anodes. The Red/Green bicolor device will typically display an orange color when the current on the red terminal is equal to the current on the green terminal. By adjusting the individual average currents, the color displayed will shift closer to the color of the die that is conducting the higher average current. A 3-leaded bicolor LED allows simplicity in drive circuitry and separate current limiting resistors.

Typical Operating Characteristics @ T_A=25°C

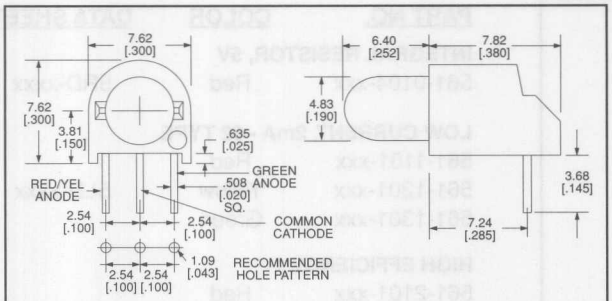
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3505	Red/Green	635/565	5/8	1.9/2.1	10	±32.5	5TD-XXXX
550-3605	Yellow/Green	583/565	5/8	2.1/2.1	10	±32.5	

Data shown as R/G or Y/G as applicable

5mm
LED CBI® Circuit Board Indicator
3 Leaded, Bicolor, In Line

Dialight

550-3x09



Dimensions in mm[inches]

PART NO.	COLOR	LED DATA SHEET
550-3509	Red/Green	5TD-XXXX
550-3609	Yellow/Green	

Benefits

- Bi-color design conserves board space
- 3 leaded design simplifies drive circuitry
- Black case enhances contrast
- Housing material UL94V-O rated
- Housing assures proper LED Alignment
- Vibration and shock resistant
- High reliability - life measured in years

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

Application of Bicolor LEDs

A bicolor LED can produce a wide variety of colors in the range between the 2 colors. This function is achieved by varying the bias current or duty cycle that is applied to the device anodes. The Red/Green bicolor device will typically display an orange color when the current on the red terminal is equal to the current on the green terminal. By adjusting the individual average currents, the color displayed will shift closer to the color of the die that is conducting the higher average current. A 3-leaded bicolor LED allows simplicity in drive circuitry and separate current limiting resistors.

6

Typical Operating Characteristics @ T_A=25°C

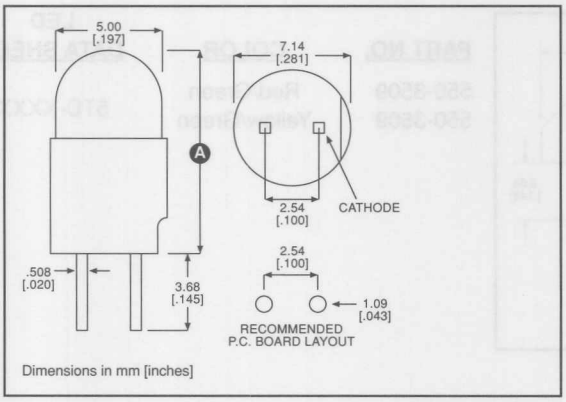
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3509	Red/Green	635/565	5/8	1.9/2.1	10	±32.5	5TD-XXXX
550-3609	Yellow/Green	583/565	5/8	2.1/2.1	10	±32.5	

Data presented as R/G or Y/G as applicable

5mm
LED CBI® Circuit Board Indicator
Vertical, Various Heights

Dialight

561-xx0x-xxx



Dimensions in mm [inches]

PART NO.	COLOR	LED DATA SHEET
INTEGRAL RESISTOR, 5V		
561-0104-xxx	Red	5RD-xxxx
LOW CURRENT, 2mA - 02 TYPE		
561-1101-xxx	Red	
561-1201-xxx	Yellow	5LD-xxxx
561-1301-xxx	Green	
HIGH EFFICIENCY		
561-2101-xxx	Red	
561-2201-xxx	Green	5HD-xxxx
561-2301-xxx	Yellow	
HIGH EFFICIENCY – NON DIFFUSED		
561-2401-xxx	Red	
561-2501-xxx	Green	5HN-xxxx
561-2601-xxx	Yellow	
SUPERBRIGHT, DIFFUSED		
561-5101-xxx	Red	
561-5201-xxx	Green	5SD-xxxx
561-5301-xxx	Yellow	
SUPERBRIGHT WATER CLEAR (Non-Tinted, Non-Diffused)		
561-5501-xxx	Red	
561-5601-xxx	Green	5SW-xxxx
561-5701-xxx	Yellow	

Benefits

- Available with a variety of heights and LEDs
- Housing material meets UL 94V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment

Custom Devices

- Contact factory for other LED types or alternate heights

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheets

EXAMPLE OF PART NUMBER ORDERING CODE

Series — LED Type — Housing Height

5 6 1 - 2 1 0 1 - X X X — DIM. A

050 = 12.7 [.500]
070 = 17.8 [.700]
100 = 25.4 [1.00]

Typical Operating Characteristics @ T_A=25°C

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
561-0104-xxx	Red	635	8.0	5	10	±30	5RD-xxxx

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
561-1101-xxx	Red	635	2.0	1.8	2	±25	5LD-xxxx
561-1201-xxx	Yellow	583	1.8	1.9	2	±25	
561-1301-xxx	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
561-2101-xxx	Red	650	6.3	2.0	10	±25	5HD-xxxx
561-2201-xxx	Green	560	10	2.4	20	±35	
561-2301-xxx	Yellow	590	6.3	2.4	20	±35	

HIGH EFFICIENCY – NON-DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
561-2401-xxx	Red	635	60	2.2	10	±17.5	5HN-xxxx
561-2501-xxx	Green	565	70	2.3	10	±17.5	
561-2601-xxx	Yellow	583	50	2.2	10	±17.5	

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
561-5101-xxx	Red	650	34	2.1	20	±25	5SD-xxxx
561-5201-xxx	Green	563	34	2.2	20	±25	
561-5301-xxx	Yellow	585	34	2.2	20	±25	

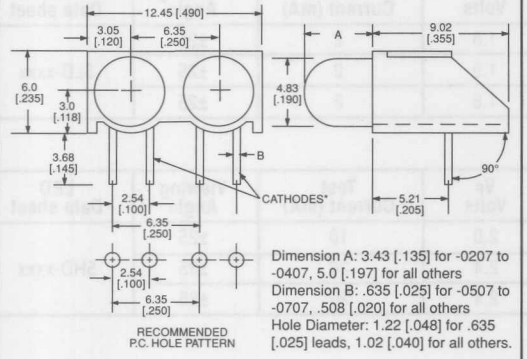
SUPER BRIGHT, WATER CLEAR (Non-Tinted, Non-Diffused)

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
561-5501-xxx	Red	635	60	2.2	20	±12	5SW-xxxx
561-5601-xxx	Green	565	75	2.3	20	±12	
561-5701-xxx	Yellow	583	140	2.2	20	±12	

5mm
LED CBI® Circuit Board Indicator
Sloped Back Housing, Dual Block

Dialight

550-xx07-002



Dimension A: 3.43 [.135] for -0207 to -0407, 5.0 [.197] for all others
Dimension B: .635 [.025] for -0507 to -0707, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others.

Dimensions in mm [inches]

*Red Cathode for Bicolor

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Standoffs on housing facilitate PC board cleaning
- Dual Block offers reduced insertions

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0207-002	Green	
550-0307-002	Yellow	5ND-XXXX
550-0407-002	Red	
INTEGRAL RESISTOR		
550-0507-002	Red, 5V	
550-0607-002	Red, 12V	5RD-XXXX
550-0707-002	Green, 5V	
550-0807-002	Yellow, 5V	
LOW CURRENT, 2mA		
550-1107-002	Red	
550-1207-002	Yellow	5LD-XXXX
550-1307-002	Green	
HIGH EFFICIENCY		
550-2207-002	Green	
550-2307-002	Yellow	5HD-XXXX
550-2407-002	Red	
BICOLOR		
550-3007-002	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5107-002	Red	
550-5207-002	Green	5SD-XXXX
550-5307-002	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5507-002	Red	
550-5607-002	Green	5SW-XXXX
550-5707-002	Yellow	

550-xx07-002

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0207-002	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0307-002	Yellow	590	3.2	2.3	20	±35	
550-0407-002	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0507-002	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0607-002	Red, 12V	655	2.0	12	13	±30	
550-0707-002	Green, 5V	565	8.0	5	12	±30	
550-0807-002	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1107-002	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1207-002	Yellow	583	1.8	1.9	2	±25	
550-1307-002	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2207-002	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2307-002	Yellow	585	6.3	2.1	10	±25	
550-2407-002	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3007-002	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5107-002	Red	650	34	2.1	20	±25	5SD-XXXX
550-5207-002	Green	563	34	2.1	20	±25	
550-5307-002	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

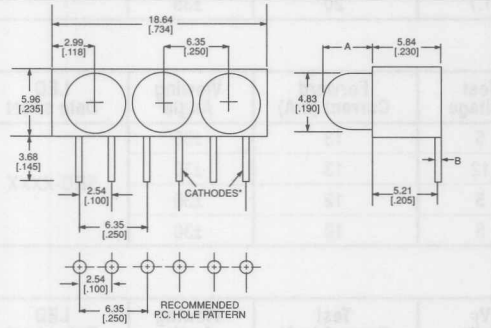
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5507-002	Red	635	125	2.2	20	±12	5SW-XXXX
550-5607-002	Green	565	120	2.3	20	±12	
550-5707-002	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Square Back Housing, Tri Block

Dialight

550-xx05-003



Dimension A: 3.43 [.135] for -0205 to -0405, 5.0 [.197] for all others
Dimension B: .635 [.025] for -0505 to -0705, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0205-003	Green	
550-0305-003	Yellow	5ND-XXXX
550-0405-003	Red	
INTEGRAL RESISTOR		
550-0505-003	Red, 5V	
550-0605-003	Red, 12V	5RD-XXXX
550-0705-003	Green, 5V	
550-0805-003	Yellow, 5V	
LOW CURRENT, 2mA		
550-1105-003	Red	
550-1205-003	Yellow	5LD-XXXX
550-1305-003	Green	
HIGH EFFICIENCY		
550-2205-003	Green	
550-2305-003	Yellow	5HD-XXXX
550-2405-003	Red	
BICOLOR		
550-3005-003	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5105-003	Red	
550-5205-003	Green	5SD-XXXX
550-5305-003	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5505-003	Red	
550-5605-003	Green	5SW-XXXX
550-5705-003	Yellow	

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Tri Block reduces insertions

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

550-xx05-003

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0205-003	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0305-003	Yellow	590	3.2	2.3	20	±35	
550-0405-003	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	Iv mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0505-003	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0605-003	Red, 12V	655	2.0	12	13	±30	
550-0705-003	Green, 5V	565	8.0	5	12	±30	
550-0805-003	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1105-003	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1205-003	Yellow	583	1.8	1.9	2	±25	
550-1305-003	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2205-003	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2305-003	Yellow	585	6.3	2.1	10	±25	
550-2405-003	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3005-003	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5105-003	Red	650	34	2.1	20	±25	5SD-XXXX
550-5205-003	Green	563	34	2.1	20	±25	
550-5305-003	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

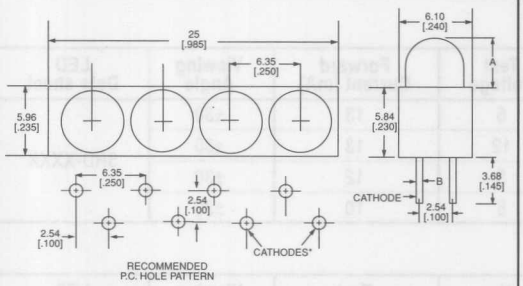
Part Number	Color	Wavelength nm	Iv mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5505-003	Red	635	125	2.2	20	±12	5SW-XXXX
550-5605-003	Green	565	120	2.3	20	±12	
550-5705-003	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Top View, Quad Block

Dialight

550-xx04-004



Dimension A: 3.43 [.125] for -0204 to -0404,4.57 [.180] for -2204 to -2404 & 5100 to 5304, 5.0 [.187] for all others
Dimension B: .635 [.025] for -0504 to -0704, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0204-004	Green	
550-0304-004	Yellow	5ND-XXXX
550-0404-004	Red	
INTEGRAL RESISTOR		
550-0504-004	Red, 5V	
550-0604-004	Red, 12V	5RD-XXXX
550-0704-004	Green, 5V	
550-0804-004	Yellow, 5V	
LOW CURRENT, 2mA		
550-1104-004	Red	
550-1204-004	Yellow	5LD-XXXX
550-1304-004	Green	
HIGH EFFICIENCY		
550-2204-004	Green	
550-2304-004	Yellow	5HD-XXXX
550-2404-004	Red	
BICOLOR		
550-3004-004	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5104-004	Red	
550-5204-004	Green	5SD-XXXX
550-5304-004	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5504-004	Red	
550-5604-004	Green	5SW-XXXX
550-5704-004	Yellow	

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Quad Block reduces insertions
- Compatible with 550-xx04 single

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

550-xx04-004

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0204-004	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0304-004	Yellow	590	3.2	2.3	20	±35	
550-0404-004	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0504-004	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0604-004	Red, 12V	655	2.0	12	13	±30	
550-0704-004	Green, 5V	565	8.0	5	12	±30	
550-0804-004	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1104-004	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1204-004	Yellow	583	1.8	1.9	2	±25	
550-1304-004	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2204-004	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2304-004	Yellow	585	6.3	2.1	10	±25	
550-2404-004	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3004-004	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5104-004	Red	650	34	2.1	20	±25	5SD-XXXX
550-5204-004	Green	563	34	2.1	20	±25	
550-5304-004	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

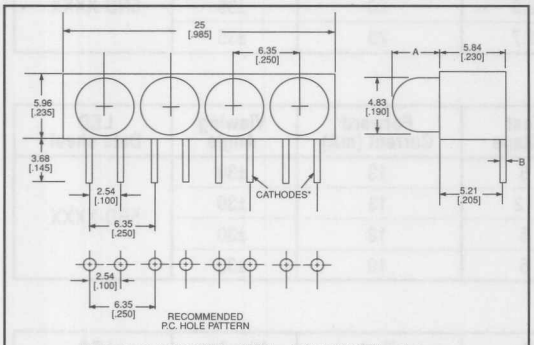
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5504-004	Red	635	125	2.2	20	±12	5SW-XXXX
550-5604-004	Green	565	120	2.3	20	±12	
550-5704-004	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Square Back Housing, Quad Block

Dialight

550-xx05-004



Dimension A: 3.43 [.135] for -0205 to -0405, 5.0 [.197] for all others
Dimension B: .635 [.025] for -0505 to -0705, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0205-004	Green	
550-0305-004	Yellow	5ND-XXXX
550-0405-004	Red	
INTEGRAL RESISTOR		
550-0505-004	Red, 5V	
550-0605-004	Red, 12V	5RD-XXXX
550-0705-004	Green, 5V	
550-0805-004	Yellow, 5V	
LOW CURRENT, 2mA		
550-1105-004	Red	
550-1205-004	Yellow	5LD-XXXX
550-1305-004	Green	
HIGH EFFICIENCY		
550-2205-004	Green	
550-2305-004	Yellow	5HD-XXXX
550-2405-004	Red	
BICOLOR		
550-3005-004	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5105-004	Red	
550-5205-004	Green	5SD-XXXX
550-5305-004	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5505-004	Red	
550-5605-004	Green	5SW-XXXX
550-5705-004	Yellow	

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Quad Block reduces insertions

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

550-xx05-004

Typical Operating Characteristics @ TA=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0205-004	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0305-004	Yellow	590	3.2	2.3	20	±35	
550-0405-004	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0505-004	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0605-004	Red, 12V	655	2.0	12	13	±30	
550-0705-004	Green, 5V	565	8.0	5	12	±30	
550-0805-004	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1105-004	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1205-004	Yellow	583	1.8	1.9	2	±25	
550-1305-004	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2205-004	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2305-004	Yellow	585	6.3	2.1	10	±25	
550-2405-004	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3005-004	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5105-004	Red	650	34	2.1	20	±25	5SD-XXXX
550-5205-004	Green	563	34	2.1	20	±25	
550-5305-004	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

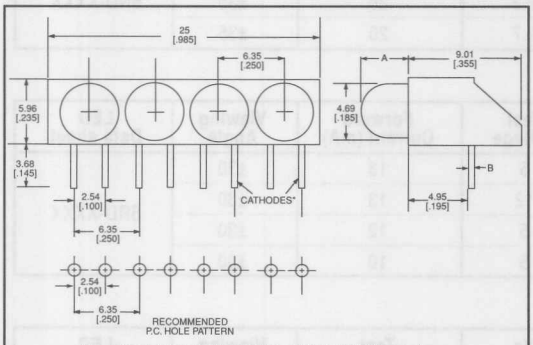
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5505-004	Red	635	125	2.2	20	±12	5SW-XXXX
550-5605-004	Green	565	120	2.3	20	±12	
550-5705-004	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Sloped Back Housing, Quad Block

Dialight

550-xx06-004



Dimension A: 3.30 [.130] for -0206 to -0406, 5.08 [.20] for all others
Dimension B: .635 [.025] for -0506 to -0706, .508 [.020] for all others
Hole Diameter: 1.22 [0.48] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0206-004	Green	
550-0306-004	Yellow	5ND-XXXX
550-0406-004	Red	
INTEGRAL RESISTOR		
550-0506-004	Red, 5V	
550-0606-004	Red, 12V	5RD-XXXX
550-0706-004	Green, 5V	
550-0806-004	Yellow, 5V	
LOW CURRENT, 2mA		
550-1106-004	Red	
550-1206-004	Yellow	5LD-XXXX
550-1306-004	Green	
HIGH EFFICIENCY		
550-2206-004	Green	
550-2306-004	Yellow	5HD-XXXX
550-2406-004	Red	
BICOLOR		
550-3006-004	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5106-004	Red	
550-5206-004	Green	5SD-XXXX
550-5306-004	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5506-004	Red	
550-5606-004	Green	5SW-XXXX
550-5706-004	Yellow	

Benefits

- Available with a variety of LEDs
- Housing material meets UL94 V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Quad Block reduces insertions

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

(NOTE: 550-xx07-004 (Pg. 6-41) includes standoffs and is recommended for replacement and new designs)

550-xx06-004

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0206-004	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0306-004	Yellow	590	3.2	2.3	20	±35	
550-0406-004	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0506-004	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0606-004	Red, 12V	655	2.0	12	13	±30	
550-0706-004	Green, 5V	565	8.0	5	12	±30	
550-0806-004	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1106-004	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1206-004	Yellow	583	1.8	1.9	2	±25	
550-1306-004	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2206-004	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2306-004	Yellow	585	6.3	2.1	10	±25	
550-2406-004	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3006-004	Red/Green	660/565	16	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5106-004	Red	650	34	2.1	20	±25	5SD-XXXX
550-5206-004	Green	563	34	2.1	20	±25	
550-5306-004	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

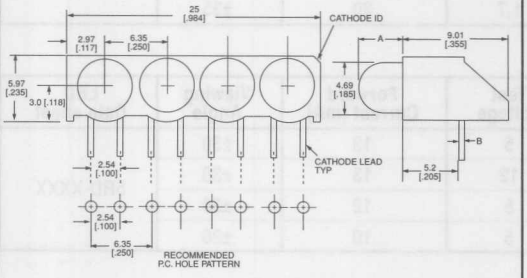
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5506-004	Red	635	125	2.2	20	±12	5SW-XXXX
550-5606-004	Green	565	120	2.3	20	±12	
550-5706-004	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Sloped Back Housing, Quad Block

Dialight

550-xx07-004



Dimension A: 3.4 [.135] for -0207 to -0407, 4.95 [.195] for all others
Dimension B: .635 [.025] for -0507 to -0707, .508 [.020] for all others
Hole Diameter: 1.22 [.048] for .635 [.025] leads, 1.02 [.040] for all others

Dimensions in mm [inches]

*Red Cathode for Bicolor

PART NO.	COLOR	LED DATA SHEET
STANDARD EFFICIENCY		
550-0207-004	Green	
550-0307-004	Yellow	5ND-XXXX
550-0407-004	Red	
INTEGRAL RESISTOR		
550-0507-004	Red, 5V	
550-0607-004	Red, 12V	5RD-XXXX
550-0707-004	Green, 5V	
550-0807-004	Yellow, 5V	
LOW CURRENT, 2mA		
550-1107-004	Red	
550-1207-004	Yellow	5LD-XXXX
550-1307-004	Green	
HIGH EFFICIENCY		
550-2207-004	Green	
550-2307-004	Yellow	5HD-XXXX
550-2407-004	Red	
BICOLOR		
550-3007-004	Red/Green	5BD-XXXX
SUPER BRIGHT, DIFFUSED		
550-5107-004	Red	
550-5207-004	Green	5SD-XXXX
550-5307-004	Yellow	
SUPER BRIGHT, WATER CLEAR (Non-tinted, Non-diffused)		
550-5507-004	Red	
550-5607-004	Green	5SW-XXXX
550-5707-004	Yellow	

Benefits

- Available with a variety of LEDs
- Housing material meets UL94V-0
- Black case enhances contrast
- High reliability - life measured in years
- Vibration and shock resistant
- Housing assures proper LED alignment
- Quad Block reduces insertions
- Standoffs on housing facilitate PC board cleaning

Custom Combinations

- Contact factory for information on custom color combinations

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

Typical Operating Characteristics @ T_A=25°C

STANDARD EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-0207-004	Green	560	3.2	2.3	20	±35	5ND-XXXX
550-0307-004	Yellow	590	3.2	2.3	20	±35	
550-0407-004	Red	665	2.0	1.7	20	±35	

INTEGRAL RESISTOR

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
550-0507-004	Red, 5V	655	2.0	5	13	±30	5RD-XXXX
550-0607-004	Red, 12V	655	2.0	12	13	±30	
550-0707-004	Green, 5V	565	8.0	5	12	±30	
550-0807-004	Yellow, 5V	583	8.0	5	10	±30	

LOW CURRENT, 2mA

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-1107-004	Red	635	2.0	1.8	2	±25	5LD-XXXX
550-1207-004	Yellow	583	1.8	1.9	2	±25	
550-1307-004	Green	565	1.8	1.8	2	±25	

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-2207-004	Green	563	10	2.1	10	±32.5	5HD-XXXX
550-2307-004	Yellow	585	6.3	2.1	10	±25	
550-2407-004	Red	650	7.0	2.2	10	±25	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-3007-004	Red/Green	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT, DIFFUSED

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5107-004	Red	650	34	2.1	20	±25	5SD-XXXX
550-5207-004	Green	563	34	2.1	20	±25	
550-5307-004	Yellow	585	34	2.2	20	±25	

SUPER BRIGHT, WATER CLEAR (NON-TINTED, NON-DIFFUSED)

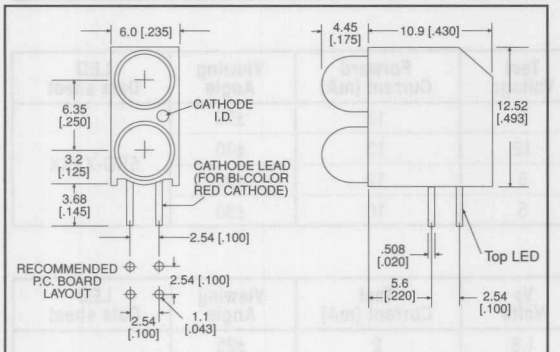
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
550-5507-004	Red	635	125	2.2	20	±12	5SW-XXXX
550-5607-004	Green	565	120	2.3	20	±12	
550-5707-004	Yellow	583	140	2.2	20	±12	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
Bi-level

Dialight

552-0xxx



Dimensions in mm [inches]

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY, 02 TYPE		
552-0211	Red/Red	
552-0222	Green/Green	5HD-XXXX
552-0233	Yellow/Yellow	
INTEGRAL RESISTOR, 5V, -03 TYPE		
552-0311	Red/Red	
552-0322	Green/Green	5RD-XXXX
552-0333	Yellow/Yellow	
BICOLOR, -07 TYPE		
552-0711	R•G/R•G	5BD-XXXX
SUPER BRIGHT, -08 TYPE		
552-0811	Red/Red	
552-0822	Green/Green	5SD-XXXX
552-0833	Yellow/Yellow	
LOW CURRENT, 2mA, -09 TYPE		
552-0911	Red/Red	
552-0922	Green/Green	5LD-XXXX
552-0933	Yellow/Yellow	

* Top/Bottom LED

Benefits

- Available with a variety of LEDs
- Standoffs on housing facilitate PC board cleaning
- Bi-level design conserves board space
- Black case enhances contrast
- High reliability - life measured in years
- Housing material meets UL94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC Board insertion of 2 LEDs

Custom Combinations

- Contact factory for information on custom color combinations and ganged arrays

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet.

EXAMPLE OF PART NUMBER ORDERING CODE



1) Red or R/G Bicolor, 2) Green, 3) Yellow

Typical Operating Characteristics @ T_A=25°C

HIGH EFFICIENCY

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
552-0211	Red/Red	650	7.0	2.2	10	±25	5HD-XXXX
552-0222	Grn/Grn	563	10	2.1	10	±32.5	
552-0233	Yel/Yel	585	6.3	2.1	10	±25	

INTEGRAL RESISTOR, 5V

Part Number	Color	Wavelength nm	I_V mcd	Test Voltage	Forward Current (mA)	Viewing Angle	LED Data sheet
552-0311	Red/Red	655	2.0	5	13	±30	5RD-XXXX
552-0322	Grn/Grn	565	8.0	5	12	±30	
552-0333	Yel/Yel	583	8.0	5	10	±30	

BICOLOR

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
552-0711	R•G/R•G	660/565	14/6	1.75/2.0	10	±70	5BD-XXXX

SUPER BRIGHT

Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
552-0811	Red/Red	650	34	2.1	20	±25	5SD-XXXX
552-0822	Grn/Grn	563	34	2.2	20	±25	
552-0833	Yel/Yel	585	34	2.2	20	±25	

LOW CURRENT, 2mA

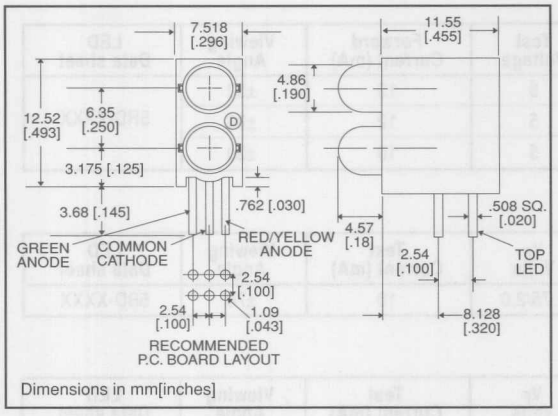
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
552-0911	Red/Red	635	2.0	1.8	2	±25	5LD-XXXX
552-0922	Grn/Grn	565	1.8	1.8	2	±25	
552-0933	Yel/Yel	583	1.8	1.9	2	±25	

Note: See LED Data Sheet for additional information.

5mm
LED CBI® Circuit Board Indicator
3 Leaded, Bi-Color, Bi-Level

Dialight

552-35xx



PART NO.	COLOR	LED DATA SHEET
552-3511	R-G/R-G	5TD-XXXX
552-3577	Y-G/Y-G	

Benefits

- Single PC Board insertion of 2 Bicolor LEDs
- 3 leaded design simplifies drive circuit
- Bi-color, bilevel design conserves board space
- Standoffs on housing facilitate PC board cleaning
- Black case enhances contrast
- Housing material UL94V-O rated
- Housing assures proper LED Alignment
- Vibration and shock resistant
- High reliability - life measured in years

LED Data

- For absolute maximum ratings and other electrical/optical data refer to LED data sheet

Application of Bicolor LEDs

A bicolor LED can produce a wide variety of colors in the range between the 2 colors. This function is achieved by varying the bias current or duty cycle that is applied to the device anodes. The Red/Green bicolor device will typically display an orange color when the current on the red terminal is equal to the current on the green terminal. By adjusting the individual average currents, the color displayed will shift closer to the color of the die that is conducting the higher average current. A 3-leaded bicolor LED allows simplicity in drive circuitry and separate current limiting resistors.

Typical Operating Characteristics @ T_A=25°C

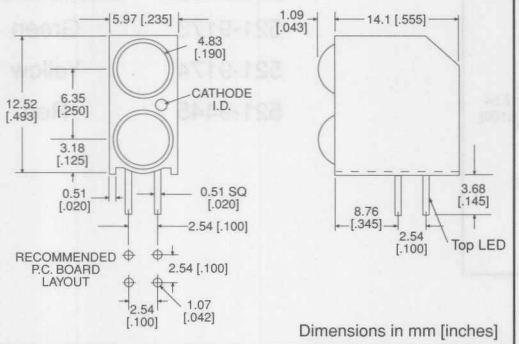
Part Number	Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
552-3511	Red/Green	635/565	5/8	1.9/2.1	10	±32.5	5TD-XXXX
552-3577	Yellow/Green	583/565	5/8	2.1/2.1	10	±32.5	

Data presented as R/G or Y/G as applicable

5mm
LED CBI® Circuit Board Indicator
Bi-level For Backlighting

Dialight

552-22xx-100



Dimensions in mm [inches]

PART NO.	COLOR*	LED DATA SHEET
HIGH EFFICIENCY, TINTED, NON DIFFUSED		
552-2211-100	Red/Red	
552-2222-100	Green/Green	
552-2223-100	Green/Yellow	5HN-XXXX
552-2232-100	Yellow/Green	
552-2233-100	Yellow/Yellow	

* Top/Bottom LED

EXAMPLE OF PART NUMBER ORDERING CODE

SERIES — Top Position — Bottom Position

5	5	2	-	2	2	X	X	-	1	0	0

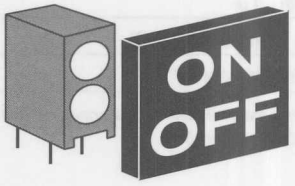
Benefits

- High efficiency tinted, non-diffused LEDs
- Extended housing eliminates light bleed
- Bi-level design conserves board space
- Narrow viewing angle
- High reliability - life measured in years
- Housing material meets UL 94V-0
- Vibration and shock resistant
- Housing assures proper LED alignment
- Single PC board insertion 2 LEDs

Custom Combinations

- Contact factory for information on custom color combinations and ganged arrays.

TYPICAL BACKLIGHT APPLICATION



6

DIALIGHT'S EXTENDED HOUSING BACKLIGHTING PRODUCTS

This new family of products was designed specifically for backlight applications. Typical concerns when backlighting are brightness and control of adjacent LED bleed of color. This new family addresses both of these issues. First, the housing is extended around the LED, thus reducing bleed. Secondly, all of the extended housing family products are produced with tinted non-diffused LEDs. These have a narrow viewing angle. This further reduces bleed and results in a high intensity on axis light source.

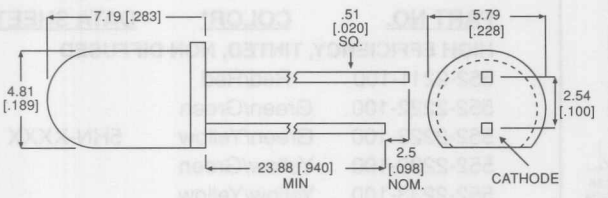
Typical Operating Characteristics @ T_A=25°C

Color	Wavelength nm	I_V mcd	V_F Volts	Test Current (mA)	Viewing Angle	LED Data sheet
Green	565	110	2.2	20	±15	5HN-XXXX
Yellow	585	110	2.2	20	±15	
Red	650	110	2.1	20	±15	

5mm Discrete LED
Low Profile
Tinted, Diffused

Dialight

521-9173, -9174, -9445



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9173	Green
521-9174	Yellow
521-9445	Red

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9173	-9174	-9445
Power dissipation (mW)	60	60	60
Derating (mW/°C)	1.14[1]	1.14[1]	.66[2]
Forward Current (mA)	20	20	20
Peak Current (mA) *Pulse width = 1 µs*	60	60	60
Operating Temperature (°C)	-25/+85	-25/+85	-25/+85
Storage Temperature (°C)	-30/+100	-30/+100	-30/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

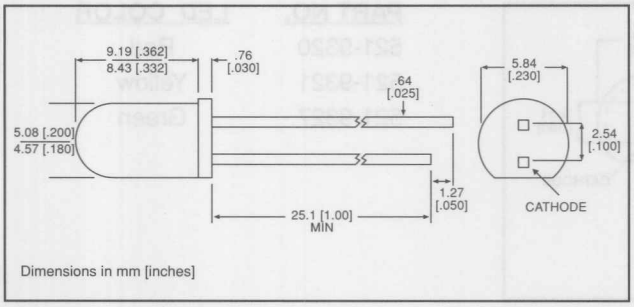
1. From 50°C 2. From 40°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9173	-9174	-9445
Luminous intensity (mcd)	Min.	3.6	2.2	2.2
I_F=10mA	Typical	10	6.3	6.3
Peak Wavelength (nm) λ Peak	Typical	565	585	650
Viewing Angle	Typical	±35°	±35°	±25°
Forward Voltage (V)	Typical	2.1	2.1	2.0
I_F=10mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	3*
* I_R=10µA				

5mm Discrete LED
Integral Resistor, 5V
Tinted, Diffused

Dialight

521-9183, -9284, -9285



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9183	Red
521-9284	Yellow
521-9285	Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9183	-9284	-9285
Forward Voltage (V)	7.5	7.5	7.5
Derating (V/°C)	.071[1]	.071[1]	.071[1]
Operating Temperature (°C)	-40/+85	-40/+85	-20/+85
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 50°C

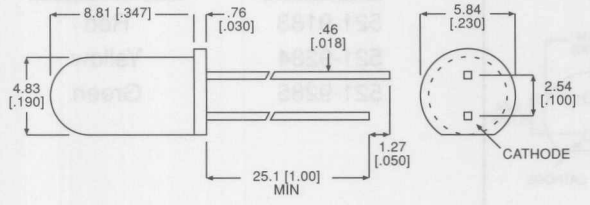
6

OPERATING CHARACTERISTICS (T_A=25°C)		-9183	-9284	-9285
Luminous intensity (mcd)	Min.	2.0	2.0	1.5
V_F=5.0V	Typical	8.0	8.0	4.0
Peak Wavelength (nm)	Typical	635	583	565
λ Peak				
Viewing Angle	Typical	±30°	±30°	±30°
Forward Current (I)	Typical	10	10	12
V_F=5.0V	Max.	15	15	15
Reverse Voltage (V), I_R=100μA	Min.	5.0	5.0	5.0

5mm Discrete LED
Low Current, 2mA
Tinted, Diffused

Dialight

521-9320, -9321, -9327



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9320	Red
521-9321	Yellow
521-9327	Green

ABSOLUTE MAXIMUM RATINGS (TA=25°C)	-9320	-9321	-9327
Power dissipation (mW)	27	36	24
Derating (mA/°C)	1.0[1]	1.0[1]	1.0[1]
Forward Current (mA)	7	7	7
Peak Current (mA) *Pulse width = 10 µs*	500	500	500
Operating Temperature (°C)	-55/+100	-55/+85	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

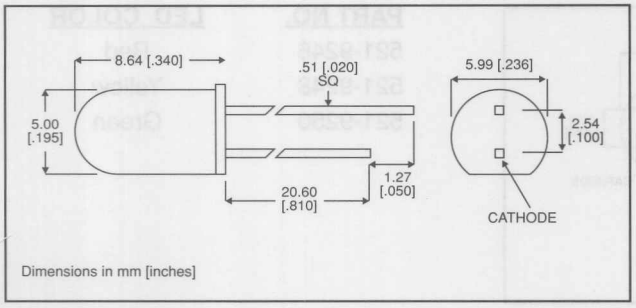
1. From 92°C

OPERATING CHARACTERISTICS (TA=25°C)		-9320	-9321	-9327
Luminous intensity (mcd)	Min.	1.2	1.2	1.2
I_F=2mA	Typical	2.0	1.8	1.8
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±25°	±25°	±25°
Forward Voltage (V)	Typical	1.8	1.9	1.9
I_F=2mA	Max.	2.2	2.7	2.2
Reverse Voltage (V), I_R=50µA	Min.	5.0	5.0	5.0

5mm Discrete LED
High Efficiency
Tinted, Diffused

Dialight

521-9240



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9240	Red

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9240
Power dissipation (mW)	60
Forward Current (mA)	25
Derating (mA/°C)	.66[1]
Peak Current (mA) *Pulse width = 1 ms*	60
Operating Temperature (°C)	-55/+100
Storage Temperature (°C)	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 40°C

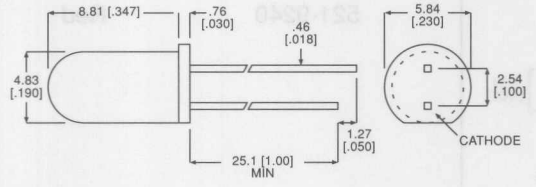
OPERATING CHARACTERISTICS (T_A=25°C)		-9240
Luminous intensity (mcd)	Min.	2.2
I_F=10mA	Typical	6.3
Peak Wavelength (nm) λ Peak	Typical	650
Viewing Angle	Typical	±25°
Forward Voltage (V)	Typical	2.0
I_F=10mA	Max.	2.5
Reverse Voltage (V), I_R=100μA	Min.	3

6

5mm Discrete LED
High Efficiency
Tinted, Diffused

Dialight

521-9246, -9248, -9250



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9246	Red
521-9248	Yellow
521-9250	Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9246	-9248	-9250
Power dissipation (mW)	135	85	135
Derating (mW/°C)	1.8	1.6[1]	1.8
Forward Current (mA)	25	20	25
Peak Current (mA) *Pulse width = 10µs*	500	500	500
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

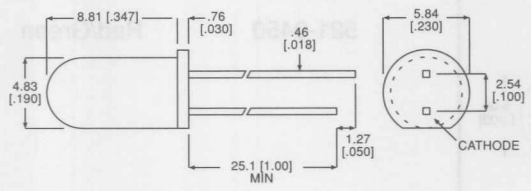
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9246	-9248	-9250
Luminous intensity (mcd)	Min.	4.0	4.0	4.2
I_F=10mA	Typical	7.0	8.0	5.2
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±30°	±30°	±30°
Forward Voltage (V)	Typical	2.2	2.2	2.3
I_F=10mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

5mm Discrete LED
High Brightness
Tinted, Non-Diffused

Dialight

521-9247, -9249, -9251



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9247	Red
521-9249	Yellow
521-9251	Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9247	-9249	-9251
Power dissipation (mW)	135	85	135
Derating (mW/°C)	1.8	1.6[1]	1.8
Forward Current (mA)	30	20	30
Peak Current (mA) *Pulse width = 10µs*	500	500	500
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 50°C

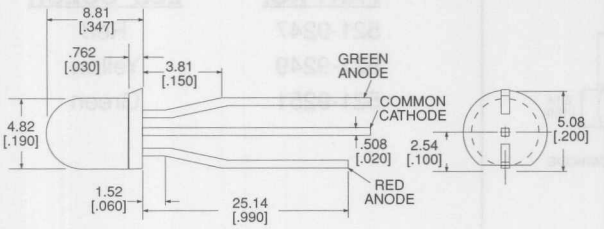
OPERATING CHARACTERISTICS (T_A=25°C)		-9247	-9249	-9251
Luminous intensity (mcd)	Min.	25	25	25
I_F=10mA	Typical	60	50	70
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±17.5°	±17.5°	±12°
Forward Voltage (V)	Typical	2.2	2.2	2.3
I_F=10mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

6

5mm Discrete LED
High Efficiency Bi-Color
3 Leaded Diffused

Dialight

521-9450



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9450	Red/Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9450
Power dissipation (mW)	135
Forward Current (mA) Derating (mA/°C)	25 0.5[1]
Peak Current (mA) *Pulse width = 10 µs*	90
Operating Temperature (°C)	-20/+85
Storage Temperature (°C)	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. from 50°C

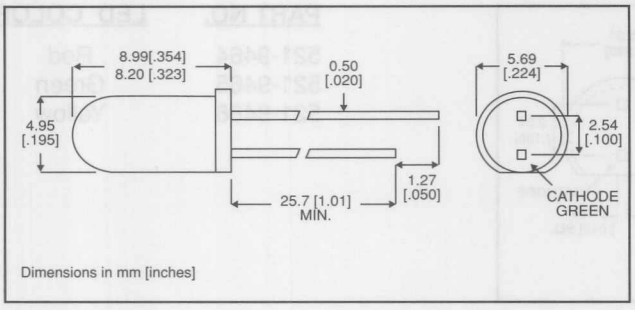
OPERATING CHARACTERISTICS (T_A=25°C)		-9450
Luminous intensity (mcd) I_F=10mA	Min. Typical	2.1/4.2 5/8
Dominant Wavelength (nm) λ Dom.	Typical	626/569
Peak Wavelength (nm) λ Peak	Typical	635/565
Viewing Angle	Typical	±32.5°
Forward Voltage (V) I_F=10mA	Typical Max.	1.9/2.1 2.5/2.7
Reverse Voltage (V), I_R=100µA	Min.	5.0

Note: Data shown as Red/Green.

5mm Discrete LED
Bi-Color
Non-Tinted, Diffused

Dialight

521-9462



PART NO.	LED COLOR
521-9462	Red/Green

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9462
Power dissipation (mW)	150
Forward Current (mA) Derating (mA/°C)	45 .75[1]
Peak Current (mA) *Pulse width = 10 µs*	1000
Operating Temperature (°C)	-55/+100
Storage Temperature (°C)	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 40°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9462
Luminous intensity (mcd) I_F=10mA	Min. Typical	6.0/4.0 14/6.0
Dominant Wavelength (nm) λ Dom.	Typical	645/570
Peak Wavelength (nm) λ Peak	Typical	660/565
Viewing Angle	Typical	±70°
Forward Voltage (V) I_F=10mA	Typical Max.	1.75/2.0 2.6

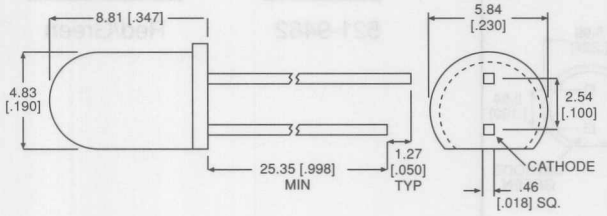
Note: Data shown Red/Green

6

5mm Discrete LED
Superbright, Waterclear
Non-Tinted, Non-Diffused

Dialight

521-9464,-9465,-9466



Dimensions in mm [inches]

PART NO.	LED COLOR
521-9464	Red
521-9465	Green
521-9466	Yellow

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9464	-9465	-9466
Power dissipation (mW)	135	135	85
Derating (mW/°C)	1.8	1.8	1.6[1]
Forward Current (mA)	30	30	20
Peak Current (mA) *Pulse width = 10 µs*	500	500	500
Operating Temperature (°C)	-55/+100	-20/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

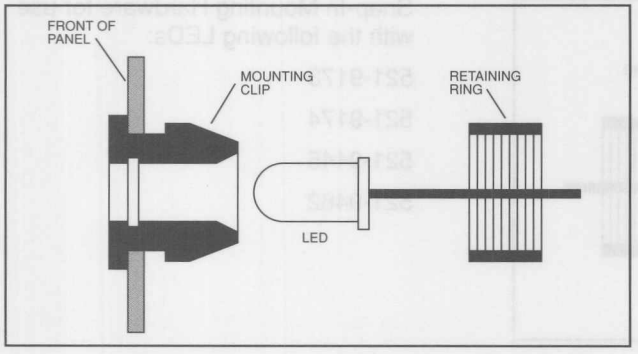
Soldering Temperature is 260 °C, 5 seconds 1.6 mm from case
1. From 50 °C

OPERATING CHARACTERISTICS (T_A=25°C)		-9464	-9465	-9466
Luminous intensity (mcd)	Min.	80	80	80
I_F=20mA	Typical	125	120	140
Peak Wavelength (nm) λ Peak	Typical	635	565	583
Viewing Angle	Typical	±12°	±12°	±12°
Forward Voltage (V)	Typical	2.2	2.3	2.2
I_F=20mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

5mm LED
Snap-In Mounting Hardware

Dialight

515-0004

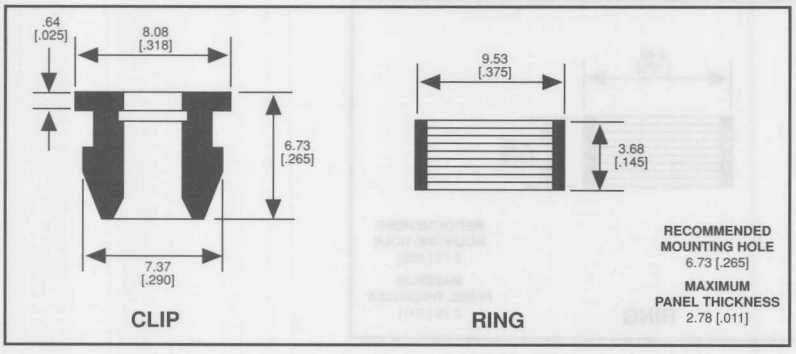


Snap-In Mounting Hardware for use with the following LEDs:

521-9183	521-9284
521-9246	521-9285
521-9247	521-9320
521-9248	521-9327
521-9249	521-9464
521-9250	521-9465
521-9251	521-9466

Mounting Instructions

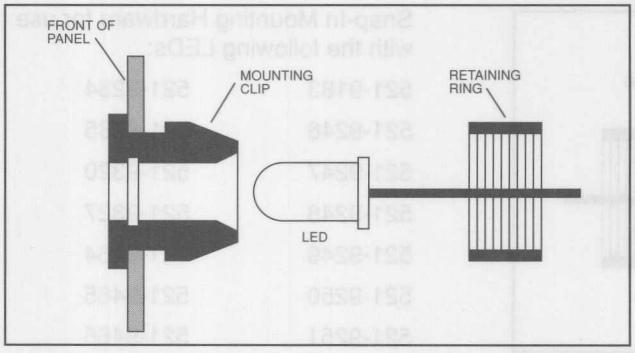
1. Snap Mounting Clip into front of Panel.
2. Insert LED Lamp into Mounting Clip from rear of Panel.
3. Snap Retaining Ring over Mounting Clip from rear.



5mm LED
Snap-In Mounting Hardware

Dialight

515-0005



Snap-In Mounting Hardware for use with the following LEDs:

521-9173

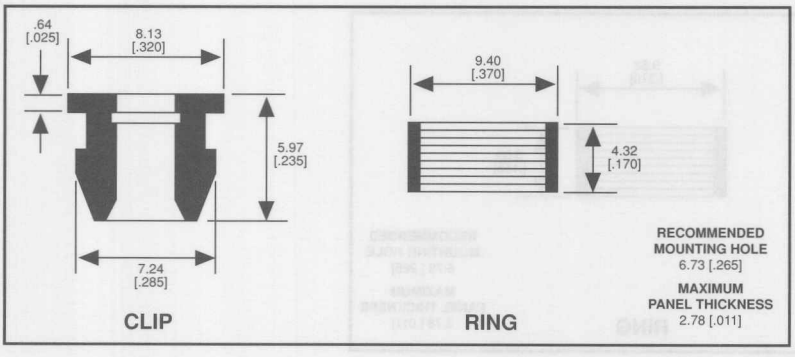
521-9174

521-9445

521-9462

Mounting Instructions

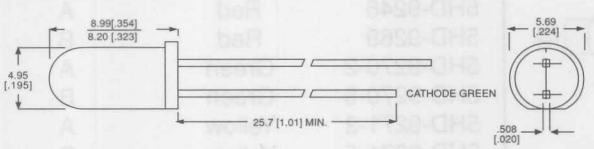
1. Snap Mounting Clip into front of Panel.
2. Insert LED Lamp into Mounting Clip from rear of Panel.
3. Snap Retaining Ring over Mounting Clip from rear.



5mm
Bi-Color LED
Non-Tinted, Diffused

Dialight

5BD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5BD-9462	Red/Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9462
Power dissipation (mW)	150
Forward Current (mA) Derating (mA/°C)	45 .75[1]
Peak Current (mA) *Pulse width = 10 µs*	1000
Operating Temperature (°C)	-55/+100
Storage Temperature (°C)	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 40°C

OPERATING CHARACTERISTICS (T_A=25°C)	-9462	
Luminous intensity (mcd) I_F=10mA	Min. Typical	6/4 14/6
Dominant Wavelength (nm) λ Dom.	Typical	645/570
Peak Wavelength (nm) λ Peak	Typical	660/565
Viewing Angle	Typical	±70°
Forward Voltage (V) I_F=10mA	Typical Max.	1.75/2.0 2.6

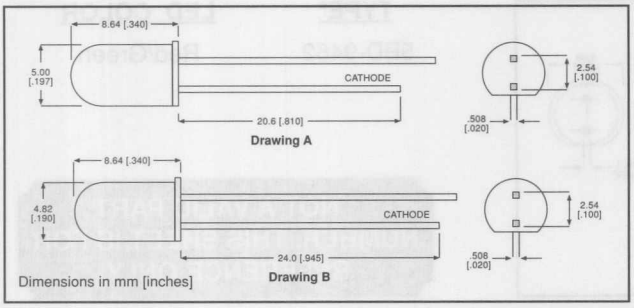
Note: Data shown Red/Green

6

5mm
High Efficiency
Tinted, Diffused

Dialight

5HD-xxxx



TYPE*	LED COLOR	DRAWING
5HD-9246	Red	A
5HD-9269	Red	B
5HD-9270-2	Green	A
5HD-9270-5	Green	B
5HD-9271-2	Yellow	A
5HD-9271-5	Yellow	B

5HD-9269/9270-5/9271-5 used in 550/552/559 series

5HD-9246/9270-2/9271-2 used in 561 series

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9246	-9269	-9270-2	-9270-5	-9271-2	-9271-5
Power dissipation (mW)	60	60	200	75	200	60
Derating (mW/°C)	.66[1]	.66[1]				
Forward Current (mA)	25	20	60	25	60	20
Derating (mA/°C)			.8[2]	.66[1]	.8[2]	.66[1]
Peak Current (mA)	60	60	1000	60	1000	60
Pulse width = 1.0 µs						
Operating Temperature (°C)	-55/+100	-25/+85	-55/+100	-25/+85	-55/+100	-25/+85
Storage Temperature (°C)	-55/+100	-30/+100	-55/+100	-30/+100	-55/+100	-30/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 40°C 2. From 25°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9246	-9269	-9270-2	-9270-5	-9271-2	-9271-5
Luminous intensity (mcd)	Min.	2.2	2.2	6*	3.6	4.0	2.2
I_F=10mA, *I_F=20mA	Typical	6.3	7.0	10*	10	10	6.3
Peak Wavelength (nm)	Typical	650	650	560	563	590	585
λ Peak							
Viewing Angle	Typical	±25°	±25°	±35°	±32.5°	±35°	±25°
Forward Voltage (V)	Typical	2.0	2.2	2.4*	2.1	2.4*	2.1
I_F=10mA, *I_F=20mA	Max.	2.5	2.5	3.0*	3.0	3.0*	3.0
Reverse Voltage (V), I_R=100µA	Min.	3	5	5*	3*	5*	3
*I_R=10µA							

5mm
High Efficiency
Tinted, Non-diffused

Dialight

5HN-xxxx

Figure A

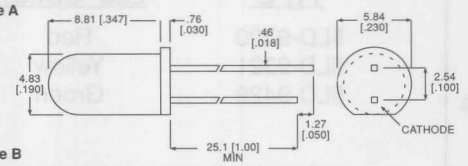
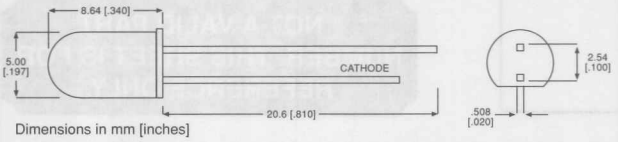


Figure B



Dimensions in mm [inches]

TYPE*	LED COLOR	FIGURE
5HN-9247	Red	A
5HN-9249	Yellow	A
5HN-9251	Green	A
5HN-9419	Red	B
5HN-9420	Green	B
5HN-9421	Yellow	B

5HN-9247/9245/9251 used in 561 series only
5HN-9419/9420/9421 used in 550/552 series

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	**-9247**	**-9249**	**-9251**	**-9419**	**-9420**	**-9421**
Power dissipation (mW)	135	85	135	75	75	75
Derating (mW/°C)	1.8	1.6	1.8	1.5[1]	1.5[1]	1.5[1]
Forward Current (mA)	30	20	30	25	25	25
Peak Current (mA) *Pulse Width = 1 µs*	500	500	500	60	60	60
Operating Temperature (°C)	-55/+100	-55/+100	-20/+100	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

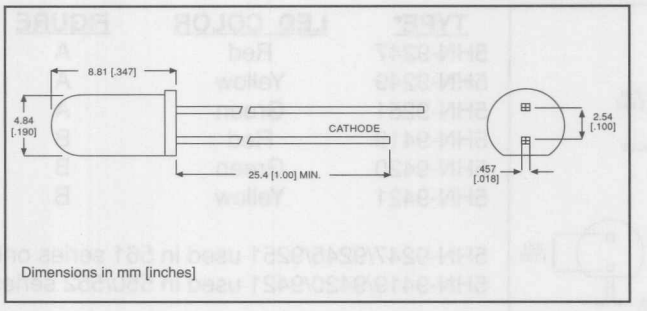
1. From 50°

OPERATING CHARACTERISTICS (T_A=25°C)		**-9247**	**-9249**	**-9251**	**-9419**	**-9420**	**-9421**
Luminous intensity (mcd)	Min.	25	25	25	56	56	56
I_F=20mA	Typical	60	50	70	110	110	110
Peak Wavelength (nm) λ Peak	Typical	635	583	565	650	565	585
Viewing Angle	Typical	±17.5°	±17.5°	±12°	±15°	±15°	±15°
Forward Voltage (V)	Typical	2.2	2.2	2.3	2.1	2.2	2.2
I_F=20mA	Max.	3.0	3.0	3.0	2.55	2.55	2.55
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0	5.0	5.0	5.0

5mm
Low Current LED
Tinted, Diffused

Dialight

5LD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5LD-9320	Red
5LD-9321	Yellow
5LD-9429	Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9320	-9321	-9429
Power dissipation (mW)	27	36	24
Forward Current (mA)	7	7	7
Derating (mA/°C)	1.0[1]	1.0[1]	1.0[1]
Peak Current (mA)	500	500	500
Pulse width = 10 µs			
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

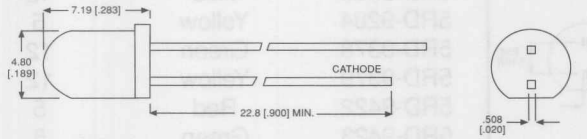
1. From 92°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9320	-9321	-9429
Luminous intensity (mcd)	Min.	1.2	1.2	1.2
I_F=2.0mA	Typical	2.0	1.8	1.8
Dominant Wavelength (nm) λ Dom.	Typical	626	585	569
Peak Wavelength (nm) λ Peak	Typical	635	583	565
Viewing Angle	Typical	±25°	±25°	±25°
Forward Voltage (V)	Typical	1.8	1.9	1.8
I_F=2.0mA	Max.	2.2	2.7	2.2
Reverse Voltage (V), I_R=50µA	Min.	5.0	5.0	5.0

5mm
Standard Efficiency
Tinted, Diffused

Dialight

5ND-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5ND-9182	Red
5ND-9267	Green
5ND-9268	Yellow

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	**-9182**	**-9267**	**-9268**
Power dissipation (mW)	120	120	120
Derating (mW/°C)	1.6[1]	1.6[1]	1.6[1]
Forward Current (mA)	50	50	50
Peak Current (mA) *Pulse width = 1 µs*	1000	1000	1000
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

1. From 25°C

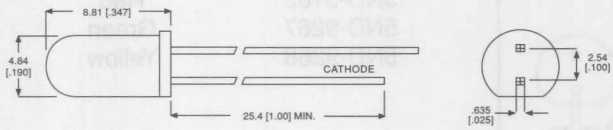
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OPERATING CHARACTERISTICS (T_A=25°C)		**-9182**	**-9267**	**-9268**
Luminous intensity (mcd)	Min.	1.0	1.6	1.0
I_F=20mA	Typical	2.0	3.2	3.2
Dominant Wavelength (nm) λ Dom.	Typical	645	570	586
Peak Wavelength (nm) λ Peak	Typical	665	560	590
Viewing Angle	Typical	±35°	±35°	±35°
Forward Voltage (V)	Typical	1.7	2.3	2.3
I_F=20mA	Max.	2.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

5mm
Integral Resistor
Tinted, Diffused

Dialight

5RD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR	VOLTS
5RD-9262	Red	12
5RD-9284	Yellow	5
5RD-9378	Green	12
5RD-9379	Yellow	12
5RD-9422	Red	5
5RD-9423	Green	5

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	**-9262**	**-9284**	**-9378**	**-9379**	**-9422**	**-9423**
Forward Voltage (V)	15	7.5	15	15	7.5	7.5
Derating (V/°C)	.086[1]	.071[1]	086[1]	.086[1]	.071[1]	.071[1]
Operating Temperature (°C)	-40/+85	-40/+85	-20/+85	-40/+85	-40/+85	-20/+85
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

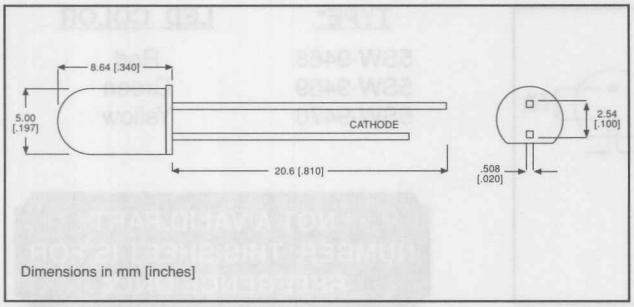
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		**-9262**	**-9284**	**-9378**	**-9379**	**-9422**	**-9423**
Luminous intensity (mcd)	Min.	1.0*	2.0	1.5*	1.5*	1.0	2.0
V_F=5V, *V_F=12V	Typical	2.0*	8.0	4.0*	4.0*	2.0	8.0
Dominant Wavelength (nm) λ Dom.	Typical	648	585	569	585	648	569
Peak Wavelength (nm) λ Peak	Typical	655	583	565	583	655	565
Viewing Angle	Typical	±30°	±30°	±30°	±30°	±30°	±30°
Forward Current (mA), V_F=5V	Typical	13*	10	13*	13*	13	12
*V_F=12V	Max.	20*	15	20*	20*	20	15
Reverse Voltage (V), I_R=100µA	Typical	5.0	5.0	5.0	5.0	5.0	5.0

5mm
Super Bright LED
Tinted, Diffused

Dialight

5SD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5SD-9441	Red
5SD-9455	Yellow
5SD-9456	Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9441	-9455	-9456
Power dissipation (mW)	75	75	75
Forward Current (mA)	25	25	25
Derating (mA/°C)	0.5[1]	0.5[1]	0.5[1]
Peak Current (mA) *Pulse width = 1 ms*	60	60	60
Operating Temperature (°C)	-55/+100	-55/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

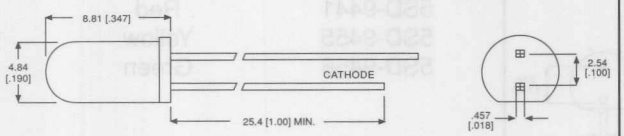
1. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9441	-9455	-9456
Luminous intensity (mcd)	Min.	17	17	17
I_F=20mA	Typical	34	34	34
Peak Wavelength (nm) λ Peak	Typical	650	585	563
Viewing Angle	Typical	±25°	±25°	±25°
Forward Voltage (V)	Typical	2.1	2.2	2.2
I_F=20mA	Max.	2.55	3.0	3.0
Reverse Voltage (V), I_R=10μA	Min.	3	3	3

5mm
Super Bright
Waterclear (Non-Tinted, Non-Diffused)

Dialight

5SW-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5SW-9468	Red
5SW-9469	Green
5SW-9470	Yellow

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9468	-9469	-9470
Power dissipation (mW)	135	135	85
Derating (mW/°C)	1.8[1]	1.8[1]	1.6[2]
Forward Current (mA)	30	30	20
Peak Current (mA) *Pulse width = 10 µs*	500	500	500
Operating Temperature (°C)	-55/+100	-20/+100	-55/+100
Storage Temperature (°C)	-55/+100	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case

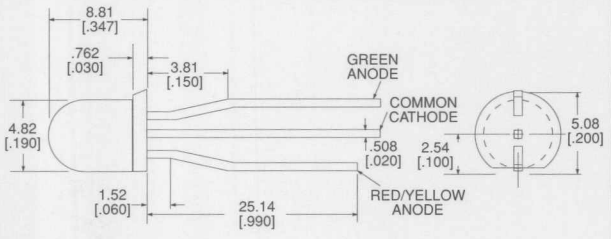
1. From 25°C 2. From 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9468	-9469	-9470
Luminous intensity (mcd)	Min.	80	80	80
I_F=20mA	Typical	125	120	140
Dominant Wavelength (nm) λ Dom.	Typical	626	569	585
Peak Wavelength (nm) λ Peak	Typical	635	565	583
Viewing Angle	Typical	±12°	±12°	±12°
Forward Voltage (V)	Typical	2.2	2.3	2.2
I_F=20mA	Max.	3.0	3.0	3.0
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0	5.0

5mm
High Efficiency Bi-Color
3 Leaded Diffused

Dialight

5TD-xxxx



Dimensions in mm [inches]

TYPE*	LED COLOR
5TD-9461	Yellow/Green
5TD-9467	Red/Green

*** NOT A VALID PART NUMBER. THIS SHEET IS FOR REFERENCE ONLY.**

ABSOLUTE MAXIMUM RATINGS (T_A=25°C)	-9461	-9467
Power dissipation (mW)	135	135
Forward Current (mA)	25	25
Derating (mA/°C)	0.5[1]	0.5[1]
Peak Current (mA) *Pulse width = 10 µs*	90	90
Operating Temperature (°C)	-20/+85	-20/+85
Storage Temperature (°C)	-55/+100	-55/+100

Soldering Temperature is 260°C, 5 seconds 1.6 mm from case
1. from 50°C

OPERATING CHARACTERISTICS (T_A=25°C)		-9461	-9467
Luminous intensity (mcd) I_F=10mA	Min. Typical	2.1/4.2 5/8	2.1/4.2 5/8
Dominant Wavelength (nm) λ Dom.	Typical	585/569	626/569
Peak Wavelength (nm) λ Peak	Typical	583/565	635/565
Viewing Angle	Typical	±32.5°	±32.5°
Forward Voltage (V) I_F=10mA	Typical Max.	2.1/2.1 2.5/2.7	1.9/2.1 2.5/2.7
Reverse Voltage (V), I_R=100µA	Min.	5.0	5.0

Note: Data shown as Red/Green and Yellow/Green as applicable.

6

LED Application Overview

Before the development of the Light Emitting diode (LED), there were two choices for status indication: neon and incandescent lamps. Both remain choices today, but are rapidly being replaced by LEDs.

The performance of LEDs has advanced to keep pace with the explosion of electronics technology into virtually every area of our lives. As LED efficiency increases, they are replacing neon and incandescent lamps in more and more applications. In fact, if it were not for LEDs, hand-held, portable, and other battery-operated electronic products would surely be less capable and easy to use.

While using LEDs may seem simple enough, as with all electronic devices there are considerations you must understand to reap the highest levels of performance in every application. Careful consideration of these guidelines can make the difference between an acceptable indication solution and one that truly shines. In addition, there are more indicator mounting choices than ever before, including the widely-used surface-mount process.

LEDs are becoming widely accepted in many applications where the incandescent lamp has been king. LEDs are even finding uses in large indicator applications ranging from vehicle brake lights to outdoor signs, in which an LED array can deliver unmatched long-term reliability, outstanding brightness, low power consumption, shock and vibration resistance, and no need for maintenance.

To simplify your optical design decisions, Dialight has prepared the following application notes. It begins with a practical discussion of LEDs and their operation and applications, and continues with discussions of the major LED solutions available today.

We've covered the basic characteristics of LEDs, how they compare with incandescent and neon lamps, LED packages and configurations, right-angle solutions, surface-mount devices, and panel mount indicators, followed by a glossary. You won't find any equations in the Data Book...it's a practical treatment of the subject.

We hope you find the Data Book a help in your work and a refreshing treatment of this important but often overlooked element of your system.

Getting to Know LEDs, Applications and Solutions

Light-emitting diodes (LEDs) are a reliable means of indication compared to light sources such as incandescent and neon lamps. LEDs are solid-state devices requiring little power and generating little heat (see Fig. 1). Because their heat generation is low and because they do not rely on a deteriorating material to generate light, LEDs have long operating lifetimes. One of the alternatives, incandescent bulbs, consume much more power, generate a great deal of heat, and rely on a filament that deteriorates in use. Neon bulbs, on the other hand, rely on an excited plasma which, along with its electrodes, can deteriorate over time. Both neon and incandescent bulbs operate on AC line voltages, while LEDs operate from low-voltage, low-current DC lines.

The venerable incandescent bulb has been the predominant light source of choice in indication applications since

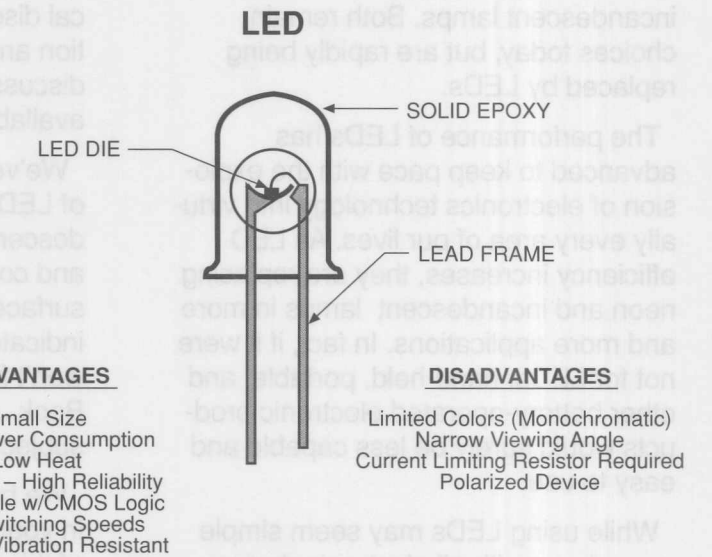


Figure 1

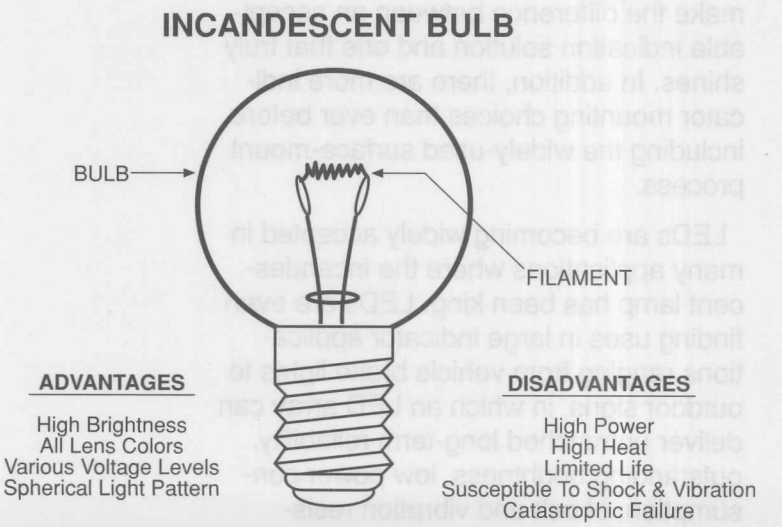


Figure 2

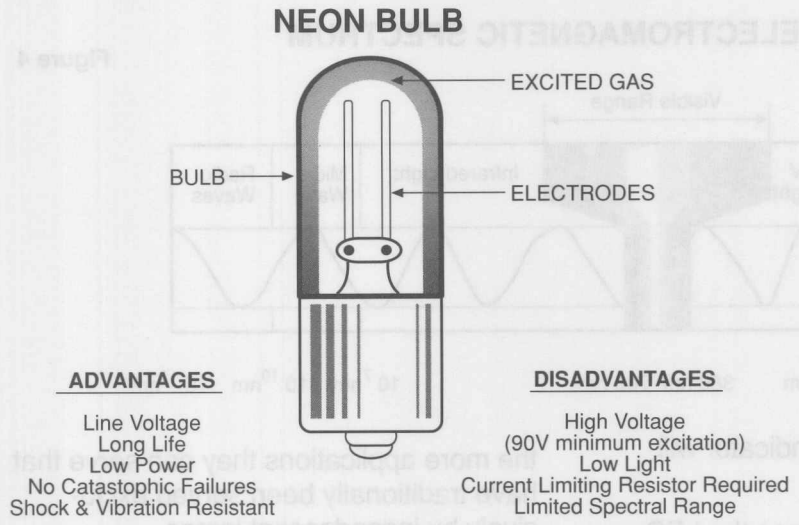


Figure 3

there were things to indicate. It consists of a heated metal filament that radiates light inside a clear bulb (see Fig. 2). The radiated light is white, consisting of a wide spectrum of electromagnetic radiation. Incandescent bulbs generate high-intensity light for a short operating lifetime, and are susceptible to damage from vibration.

Neon bulbs consist of electrodes encased in a glass bulb with a phosphorescent gas (see Fig. 3). They offer relatively long operating lifetimes (compared to incandescent bulbs) with lower power consumption and better resistance to shock and vibration. However, they must run at a high-voltage and incorporate a current-limiting resistor. The light these lamps provide spans a relatively narrow portion of the color spectrum and is weak in comparison to incandescent bulbs and the brightest LEDs.

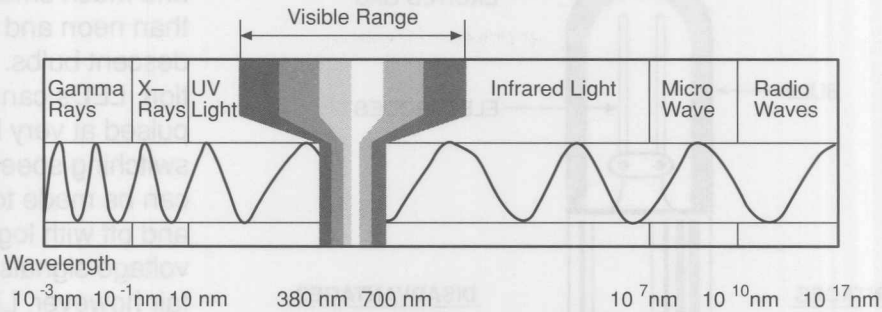
LEDs have extremely long operating lifetimes, low current draw from DC voltage lines, low heat dissipation, tremendous resistance to shock and vibration, and much smaller size than neon and incandescent bulbs. In addition, LEDs can be pulsed at very high switching speeds, and can be made to turn on and off with logic-level voltage signals. To be fair however, LEDs produce monochromatic light (a single-color), are available in only a few colors, and have relatively narrow viewing ranges. Still, for a growing number of applications, LEDs provide an extremely effective solution.

The State of LED Technology

LEDs are available in both visible colors and infrared. The visible colors include blue, yellow, green, and red, and fall into the spectral wavelength region from 400 to 700 nm (see Fig. 4). The human eye is most sensitive to green light at a wavelength of 563 nm. Bicolor LEDs are manufactured by combining two different LED chips within a common LED housing. Positive and negative voltages are applied to turn on either LED. Infrared LEDs, commonly used in remote controls for televisions and a wide variety of sensing and data communications applications, reach wavelengths of 940 nm and higher. The color of LEDs is determined exclusively by the semiconductor compound used to make it, not by the color of the surrounding epoxy lens. The lens color is used only to indicate in the

ELECTROMAGNETIC SPECTRUM

Figure 4



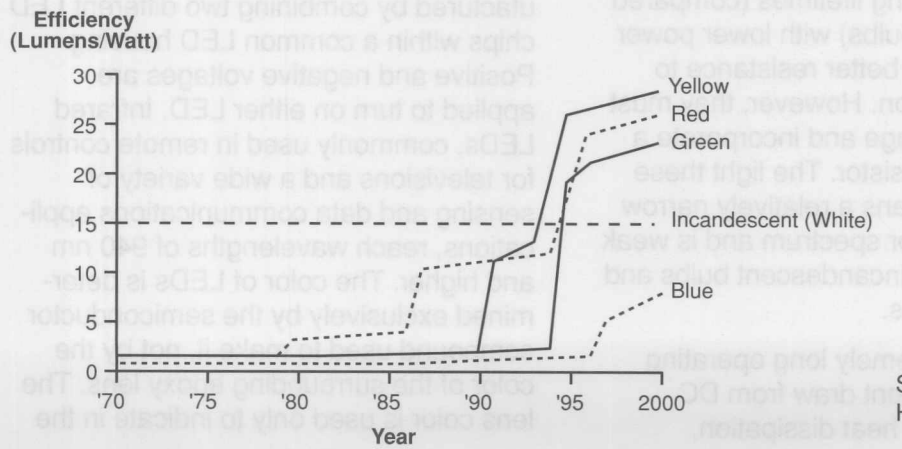
"off" state what color the indicator will display when it is "on".

For most of the period since the LED was first introduced in 1969, red LEDs were by far the most efficient and produced the greatest light output. However, research by companies such as Hewlett-Packard, Siemens, Toshiba, and Cree Research, has produced significant advances in the efficiency of blue, green, and yellow LEDs (see Fig. 5). Today, yellow LEDs match the performance of red LEDs. These advances have great importance for the application of LEDs, and the greater their efficiency becomes, the more applications they can serve that have traditionally been served exclusively by incandescent lamps.

For example, a stated goal of the automotive industry is to eliminate the incandescent bulb from as many places as possible, whether in the dashboard or in turn signals and brake lights. Current models from most automakers today use LEDs in the high-mounted center brake light, and work is being conducted to gain acceptance of LEDs in standard brake lights as well. The increase in efficiency of yellow LEDs now puts them in contention for use in turn signals as well.

EVOLUTION OF LED EFFICIENCY

Figure 5



Source:
Hewlett Packard Co.

LEDs have significant benefits in these applications. In brake lights, turn signals, and in-dash indicators, the devices will never need to be replaced throughout the life of the car. For in-dash applications, this is an even more appealing virtue because removing the dashboard in today's automobiles is a difficult, time-consuming, expensive procedure.

Work has been done on producing blue light LEDs at a wavelength of 470 nm, but these devices are relatively limited in light intensity. As a comparison, Transparent Substrate (TS) type LEDs are now available in red that produce more than 15,000 millicandelas. Blue LEDs currently produce less than 1 percent of the light intensity produced by such an LED. However, advances are being made every year, and it is anticipated that in the not-too-distant future, blue LEDs will have light output approaching their red, green, and amber counterparts. When this occurs, it will be possible to produce white light by combining red, green, and blue LEDs in a single package. In addition, once light output becomes greater, blue LEDs can replace incandescent lamps in vehicle dashboards for high-beam indication.

The automotive industry is just one example of a high-volume marketplace that is becoming accessible to the LED. Other transportation applications, as well as many others, will move from incandescent lamp to LED by the end of the decade.

Operating Principles and Specifications

How do LEDs emit light? The process is based on the change in energy levels when holes and electrons combine in the negative (N) region of a positive-negative (PN) semiconductor diode. During these shifts in energy, photons are generated, some of which are absorbed by the semiconductor material and some of which are emitted as light energy (see Fig. 6). The wavelength of the light depends on the difference of energy levels in the recombination process as well as the type of semiconductor material used to form the LED chip.

Most diodes are specified for spectral characteristics at room temperature (25°C). Although an LED's wavelength will shift with temperature, following a typical shift of about 2.5 Angstroms per degree Centigrade as temperature increases past room temperature, this color shift is not noticeable in most applications.

LED LIGHT EMISSION AT P-N JUNCTION

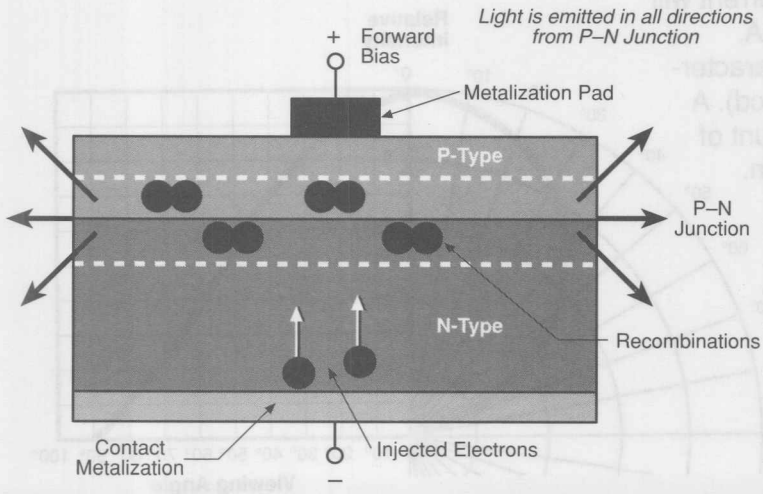
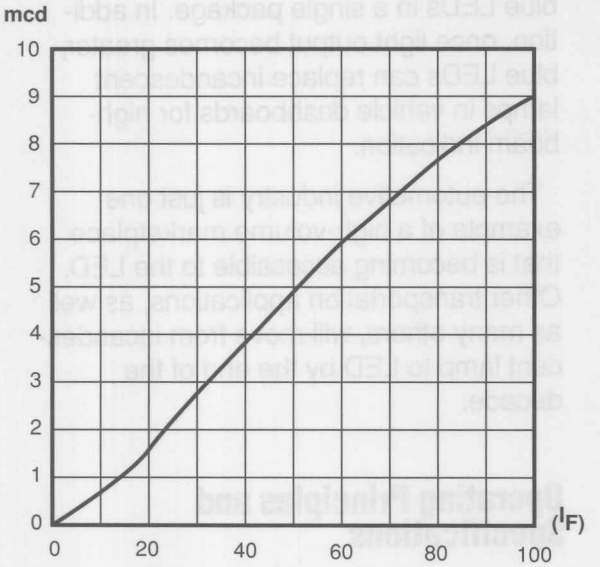


Figure 6



Relative Luminous Intensity vs. Forward Current

Figure 7

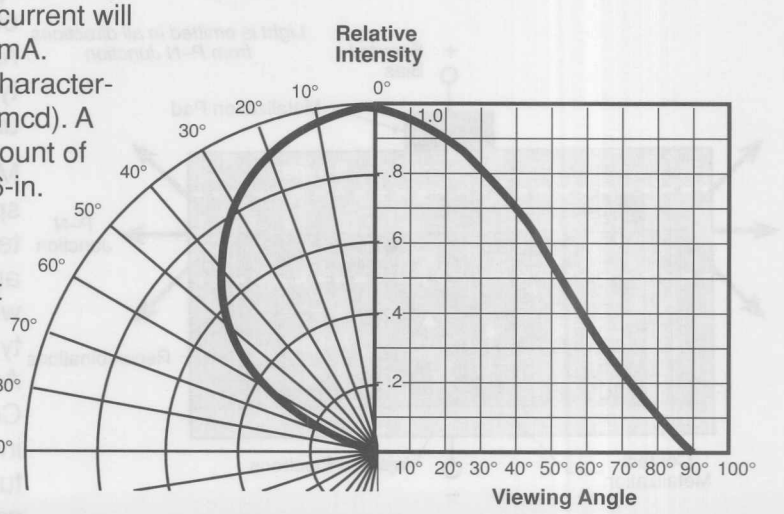
Brightness and Efficiency

An LED's brightness or luminous intensity is dependent upon the amount of forward bias current applied to the diode (see Fig. 7). An LED specified for a certain brightness with 20 mA current will provide less illumination at 10 mA. Luminous intensity is usually characterized in terms of millicandelas (mcd). A candela (1,000 mcd) is the amount of light that shines through a 1/16-in. square centimeter hole in one side of a ceramic box that has been heated to 1,772° C. Most LED manufacturers provide data sheets with minimum and typical values of luminous intensity. The human eye can generally only detect a doubling or halving in light intensity for there to appear to be more or less luminous intensity from a given source.

An LED's quantum efficiency is based on the amount of light energy generated as a function of the amount of energy applied to the LED. At elevated temperatures, an LED's quantum efficiency decreases. It also decreases with age.

LEDs do not emit light uniformly in all directions, with a sharp drop in luminous intensity as a viewer moves away from a direct or on-axis vantage point (see Fig. 8). The half-intensity beam angle, given in degrees, is used to characterize how far in degrees from the on-axis perspective a particular LED's luminous intensity drops to 50 percent. For example, given two LEDs with equal luminous intensity, the LED with a half-intensity beam angle of 40 deg. provides a wider viewing angle than the LED with a half-intensity beam angle of only 20 deg. This is true even though both may generate the same amount of luminous intensity for a given supply current.

Figure 8



Relative Luminous Intensity vs. Angular Displacement

DIFFUSED vs. NON DIFFUSED LEDs

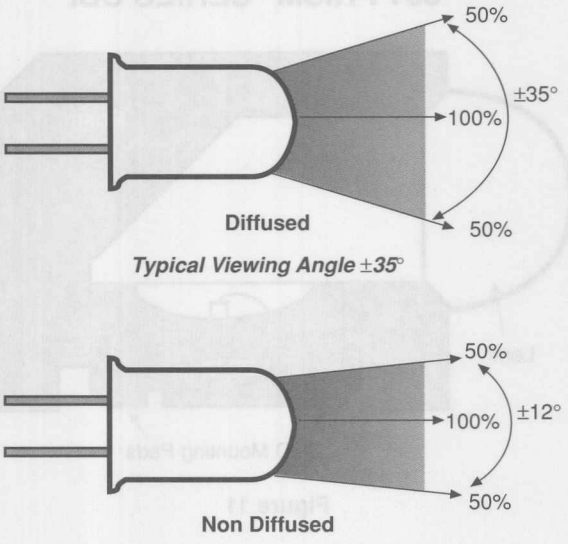


Figure 9

Factors that contribute to viewing angle include the level of diffusant (see Fig. 9), the shape of the reflector cup which surrounds the LED chip, the shape of the LED lens, and the distance from the LED to the nose of the lens. When there is no diffusant, the viewing angle is ±10 to 12 deg.; it can be up to ±70 degree when the maximum amount of diffusant is employed.

LED power dissipation is computed by multiplying the forward voltage by the forward current. For a typical LED with 2 V forward voltage that is drawing 5 mA current, the power dissipation is 10 mW. Power dissipation is a key LED characteristic because it causes the temperature of the LED to increase. Light intensity decreases and wavelength increases with increasing temperature. Low power dissipation not only translates into cost-effective operation, but long operating lifetimes as well.

The amount of current drawn by the LED makes an enormous difference when arrays of LEDs are used. Increased efficiency delivers either more light for a given current or the same amount of light for less current. Incremental increases in efficiency may seem insignificant, but each advancement can open the door to another application that was previously served only by an incandescent lamp. While each LED does not draw much current, 50 LEDs in an array can draw significant amount of current. For example, typical high efficiency LEDs once routinely drew 10 mA from a 2 VDC source. If 100 of these devices were used, 1 A would be drawn. In some types of battery-operated equipment, this would be more current than the entire unit would be expected to draw. However, today's devices often draw 1 to 2 mA, which means that in this hypothetical application the LED array would draw far less current from the battery.

Reliability data for different LEDs must be compared in terms of the amount of forward current that drives a particular LED. An LED may provide greater luminous intensity at higher current levels, but tends to have a shorter operating lifetime compared to a device running at lower current levels. At higher current levels, LEDs also tend to more quickly lose total output power over time. At forward current levels of 20 mA or less, LEDs are expected to last well over 100,000 hr. (more than 10 yr.).

Secondary Optics

In addition to the LED itself, some applications require the use of secondary optics to carry the light from the LED to the desired location on the equipment. The most common type of secondary optics employs *light pipes* (see Fig. 10). As their name implies, light pipes simply provide a method of transferring the light generated by the LED from one place to another. They can consist of fiber optics or molded lenses that reflect the light and point it to the viewing location. In the manufacturing process, light pipes require the additional step of attachment to the circuit board or front panel. They are also made of materials that will not survive the surface mount process temperatures.

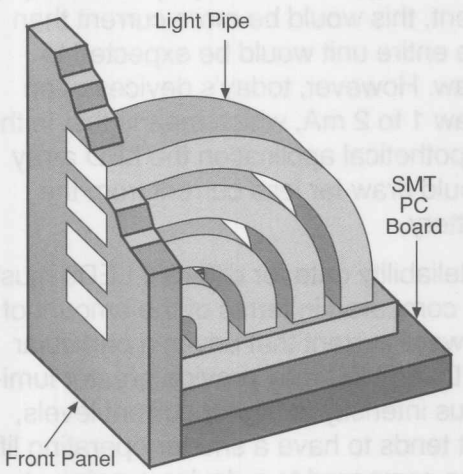


Figure 10

Another technique for adding secondary optics to the LED is found in Dialight's PRISM® CBI Series. This patented product combines the action of a light pipe with the reflective properties of a prism. It is made of high-temperature materials so it does not require an additional assembly step when used in the surface mount process. The Prism incorporates an LED and a prismatic light pipe in a housing (see Fig. 11). The prism refracts the light 90 deg. from vertical to the viewing area. In addition to providing right-angle illumination from a surface-mount LED, the Prism provides the inherent advantages of a CBI-type solution, including repeatability, precision, pick-and-place compatibility, and the potential to increase manufacturing throughput.

CUTAWAY VIEW
591 PRISM® SERIES CBI

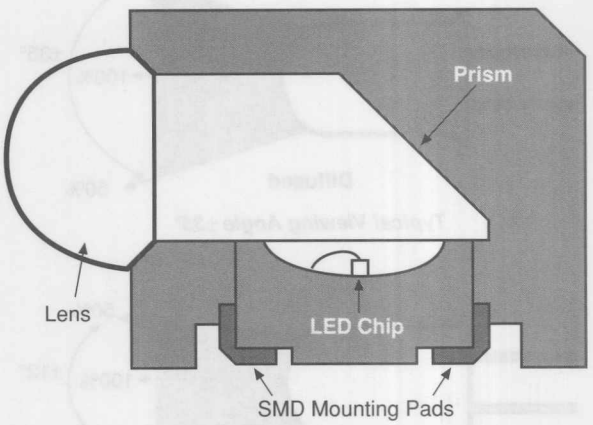


Figure 11

Backlighting

Backlighting of front panel legends using LEDs is becoming extremely popular because it allows the panel to have a smooth and finished appearance and reduces manufacturing cost. In backlighting applications, the LEDs are located behind small translucent (usually Mylar) "windows" that are flush with the faceplate. The light from the LED illuminates the window (see Fig. 12). Designers have sometimes used diffused LEDs for this

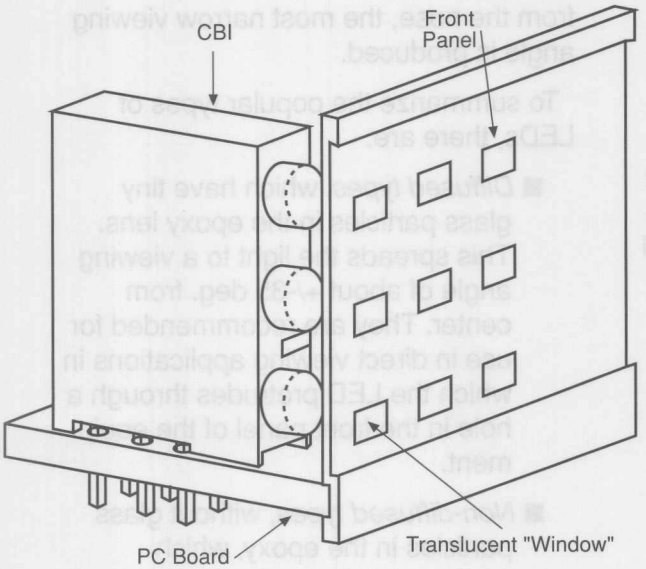


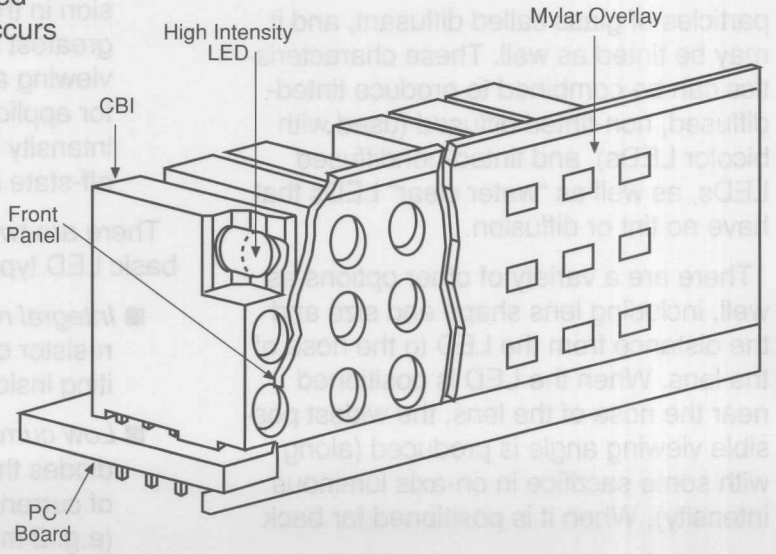
Figure 12

purpose. This results in a lack of intensity in front of the window because diffused LEDs spread their output omnidirectionally and have a viewing angle of ±35 deg. Some of the intensity is dispersed and lost before it can arrive at the window.

In addition, a condition called crosstalk or light bleeding occurs between adjacent diffused LEDs because they are designed to spread (diffuse) the light they produce. Crosstalk also occurs with nondiffused LEDs but to a much lesser degree because their light is focused on the window and its intensity is greater there. Crosstalk makes an unlit LED appear to be "on" because light from an adjacent LED is transmitted through its lens to the front panel. Crosstalk also reduces the amount of light that reaches the front panel.

To solve this problem for designers, Dialight developed a family of right-angle housings that completely enshroud a high-intensity nondiffused LED (see Fig. 13). The combination of the LED and the housing results in zero crosstalk as well as an extremely bright on-axis indicator. It provides these attributes with much greater repeatability and ease of implementation than any other method.

Figure 13



Types of LEDs and Package Configurations

Regardless of the electrical characteristics, the designer basically has a choice of LEDs with a narrow viewing angle or a wide viewing angle. The LED is available with a wide variety of physical and optical characteristics. The basic LED consists of a diode chip or die, mounted in the coined reflector cup of a lead frame, wire bonded and encased in a solid epoxy lens (see Fig. 14). The lens may have

LED CONSTRUCTION

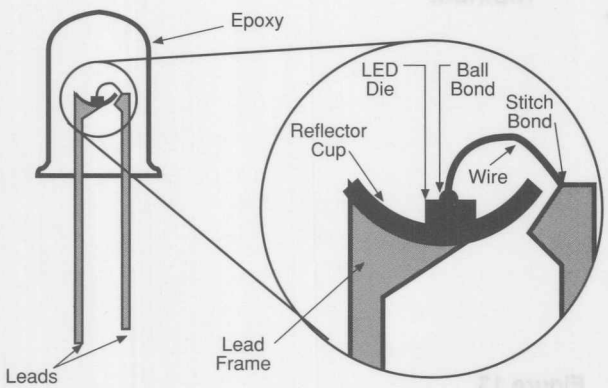


Figure 14

particles of glass called diffusant, and it may be tinted as well. These characteristics can be combined to produce tinted-diffused, non-tinted diffused (used with bicolor LEDs), and tinted-nondiffused LEDs, as well as "water clear" LEDs that have no tint or diffusion.

There are a variety of other options as well, including lens shape and size and the distance from the LED to the nose of the lens. When the LED is positioned near the nose of the lens, the widest possible viewing angle is produced (along with some sacrifice in on-axis luminous intensity). When it is positioned far back from the nose, the most narrow viewing angle is produced.

To summarize the popular types of LEDs, there are:

- *Diffused types*, which have tiny glass particles in the epoxy lens. This spreads the light to a viewing angle of about +/-35 deg. from center. They are recommended for use in direct viewing applications in which the LED protrudes through a hole in the front panel of the equipment.
- *Non-diffused types*, without glass particles in the epoxy, which produce a narrow viewing angle of +/-12 deg. They are often used for backlighting applications in which the LED light is focused on a translucent window in the front panel.
- *Tinted types*, for indication in the "off"-state of what it's color will be when in the "on"-state.
- *Water clear (non-tined, nondiffused) types*, which have no tint or diffusion in the epoxy and produce the greatest light output and narrowest viewing angle. They are designed for applications in which very high intensity or colorless LEDs in the off-state are desired.

There are two popular options for these basic LED types:

- *Integral resistor*, which includes the resistor chip required for current limiting inside the package.
- *Low current types* employing special diodes that draw the least amount of current from the power source (e.g. 2 mA).

LED Selection Criteria

Figure 15

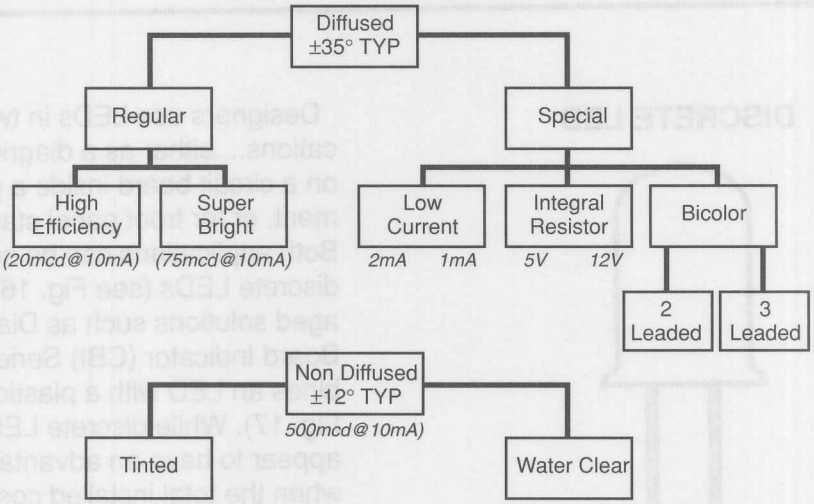


Figure 15 displays some of the key criteria used in the LED selection process.

Although LEDs are available in a wide range of shapes and sizes, three popular types are used most often:

- 2 mm (T - ¾) LEDs
- 3 mm (T - 1) LEDs
- 5 mm (T - 1 ¾) LEDs

There are four basic types of LED mounting configurations:

- Cast epoxy through-hole LEDs designed for circuit board mounting. They are the most common type of LED in use.
- LEDs in a housing designed to deliver light at a right angle from the circuit board. Dialight's CBI Series components are an excellent example.
- Surface-mountable discrete LEDs compatible with tape-and-reel automated assembly equipment for high-volume production. These LEDs are simply a light source and have no optics. Consequently, they require secondary optics such as a light pipe to get the emitted light to the front panel in an aesthetically pleasing fashion.
- LEDs in right-angle surface-mount compatible packages that employ a prism-type lens structure to direct the light parallel to the circuit board. Dialight's Prism Series components are an excellent example.

Discrete LEDs vs. Packaged Solutions

DISCRETE LED

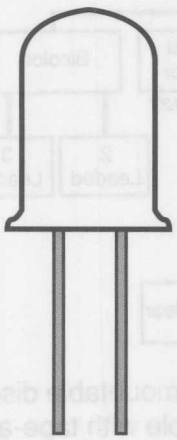


Figure 16

RIGHT ANGLE CIRCUIT BOARD INDICATOR

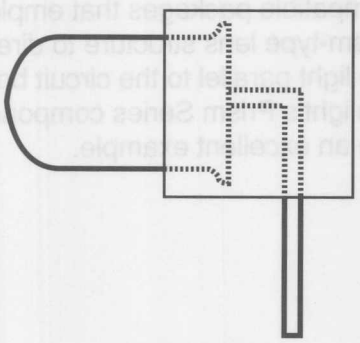


Figure 17

Designers use LEDs in two basic applications....either as a diagnostic indicator on a circuit board inside a piece of equipment, or for front panel status indication. Both applications can be served by either discrete LEDs (see Fig. 16) or by packaged solutions such as Dialight's Circuit Board Indicator (CBI) Series that combines an LED with a plastic housing (see Fig. 17). While discrete LEDs may appear to have an advantage in cost, when the total installed cost of the device is considered, the CBI solution is generally less expensive.

Diagnostic applications do not require the same level of attention to esthetics as front panel applications, since the LED is generally viewed by a technician and is not designed to enhance the appearance of the equipment. However, the devices must still deliver consistent brightness and be positioned to ensure that the proper indicator is read. A key design goal in diagnostic applications is achieving maximum component density, so 2-mm LEDs with an integral current-limiting resistor are employed to conserve circuit board space, which also reduces parts count. The LED is not viewed in bright light so there is no need for a high-intensity device.

Front panel applications require the same attention to component density, with increased emphasis on esthetic appeal. The LEDs must not only provide the basic indication or illumination function, they must also complement the appearance of the host equipment, since they are located on the front panel for all

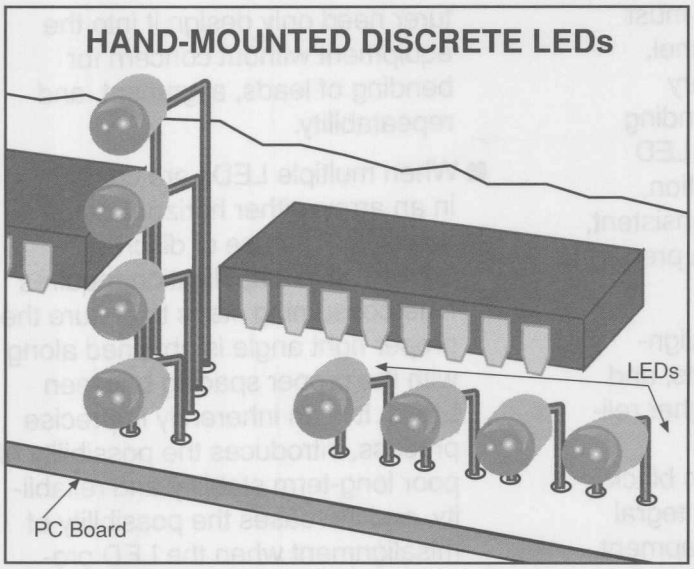


Figure 18

to see. In many cases, the appearance of the LEDs is actually a selling feature of the end product. Consequently, uniform color, alignment, and intensity are important considerations.

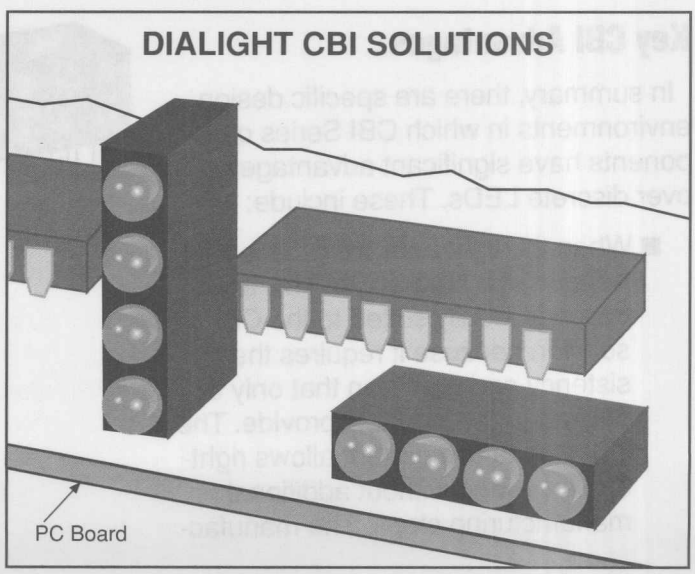
Discrete vs CBI

Discrete LEDs provide only a light source and leave the details of configuration, mounting, polarity, and alignment to the end user. For right angle applications, the manufacturer of the product must perform the steps of lead bending and alignment. For top-view applications, they must develop a means of assuring consistent LED height off the circuit board.

Discrete LEDs provide an acceptable solution if the designer wishes to perform the steps of lead trimming, bending, and alignment in-house (see Fig. 18). However, these steps require considerable labor and decrease throughput of the manufacturing process, adding cost to the end product. The CBI approach eliminates all of the steps in the manufacturing process except for the insertion of a component into the board. When a multiple-LED component is used, it reduces the number of insertions per LED as well (see Fig. 19). The CBI approach reduces installed cost by lowering the overall manufacturing and labor costs, and by increasing throughput. It also simplifies the work required to specify, purchase, and track the indicator components.

CBIs have many other advantages. When discrete LEDs are used in right-angle applications, misalignment with the

Figure 19



front panel can occur. If the LED must protrude through a hole in the panel, additional steps may be necessary including hand soldering after bending the leads to manually align each LED with the panel. With the CBI solution, LED height and alignment are consistent, because the LED is encased in a precision molded housing.

The housing maintains proper alignment of both the LED and its leads, and provides stability and ensures higher reliability. Contrast ratio is increased because the LEDs are encased in black plastic, and many types include integral standoffs, which prevent flux entrapment and aid circuit board cleaning. CBI Series components also incorporate LEDs that are matched in both intensity and color, which ensures a uniform appearance, and eliminates the need for the customer to sort and measure the intensity of the devices.

In short, the CBI approach provides the optimum esthetic solution at the lowest possible installed cost.

Key CBI Advantages

In summary, there are specific design environments in which CBI Series components have significant advantages over discrete LEDs. These include:

- When the light from the LED is needed at a right angle: This application is ideally suited to the CBI solution because it requires the consistency and precision that only a packaged solution can provide. The CBI Series component allows right-angle viewing without additional manufacturing steps. The manufacturer need only design it into the equipment without concern for bending of leads, alignment, and repeatability.
- When multiple LEDs are combined in an array, either horizontally or vertically: The use of discrete devices in this application requires time-consuming steps to ensure the proper right angle is obtained along with the proper spacing between LEDs. It is an inherently imprecise process, introduces the possibility of poor long-term stability and reliability, and increases the possibility of misalignment when the LED protrudes through a hole in the panel. In contrast, the CBI solution inherently maintains positioning and alignment, requires only one manufacturing step, and keeps crosstalk (light bleed) between LEDs in check. (see Fig. 20)

MULTI LED CBI ARRAYS

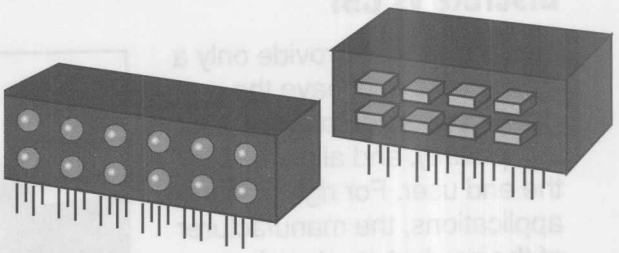


Figure 20

- When the LED must be viewed from the top relative to the plane of the circuit board (top view): Discrete LEDs need spacers to locate them a certain distance above the circuit board (see Fig. 21). These spacers must be manually applied. CBI Series components can be specified with various mounting heights and require no additional manufacturing steps.

When all of the issues relating to circuit board indication are considered, it becomes clear that the CBI approach provides a uniform, reliable, cost-effective solution.

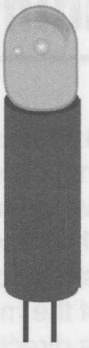


Figure 21

Surface Mount LEDs: The Winding Road to Today's Solutions

Since the mid 1980s, surface mounting of electronic components has become more and more widespread. Today it is almost universally utilized throughout the electronics industry because it increases the throughput of the manufacturing process, reduces direct labor, eliminates multiple component attachment techniques, allows the use of smaller PC boards and greater component density, and increases product reliability.

There are very few traditional electronic components that research and development efforts have not been able to make surface mountable. Most of the holdouts are either oddly shaped, sensitive to high heat or handling, or are in some way incompatible with pick-and-place robotic systems. However, every year more and more of these holdouts are converted to surface mount compatibility.

The LED was one of these holdouts, but today there are surface-mount LED solutions that satisfy the requirements of any application, from simple diagnostic environments to horizontal and vertical stacks and right-angle packages for front panel viewing.

Crafting a Solution

It is important to point out that the obstacles created by the surface-mount environment have been surmounted only through considerable research and development. The requirements of surface mounting are nearly all detrimental to achieving good optical performance. In general, a broad range of focal depth is desirable, along with the ability to use a reflector cup and a rounded lens. The surface-mount process makes all of these attributes either difficult or impossible to achieve.

For example, surface-mount LEDs must be lightweight in order to be picked up by the suction of vacuum pick-and-place equipment. This severely reduces the amount of optics that can be incorporated in the device. The devices must also be flat, which both hinders optical performance and reduces the number of options available to the designer. Surface-mount LEDs must also be small enough to fit in EIA-standard tape-and-reel packaging, The package must be self-aligning and able to withstand the high reflow temperatures and harsh solvents encountered in the surface-mount environment. Finally, the optics and esthetic features of the device must survive the process unscathed.

In the short time that surface-mount LEDs have been available, Dialight and other manufacturers have made great progress in bringing the traditional characteristics of the through-hole LED to the surface-mount environment.

Evolution of Surface-Mount LEDs

In the early 1980s, the first LEDs constructed of materials that could survive the surface mount process were introduced. These devices, configured in the familiar SOT-23 transistor package, allow LEDs to be robotically placed on the circuit board for the first time. However, they have no optics, so the light they emit is largely unfocused (see Fig. 22). They were are nevertheless quite inexpensive and are still available today.

As a way to incorporate optics with the device and to broaden the number of options available, designers looked to standard cast-epoxy, through-hole-type LEDs, and pressed them into service as surface-mount components. In this operation, the leads of the device were bent, held in place, their leads soldered, and the final angle of the device (presumably around 90 deg. from vertical) determined. The technique essentially negates the inherent advantages in throughput and cost provided by surface mounting. It has also proven to be unreliable because in repeated tests, through-hole LED have been shown not to be process-survivable. Consequently, it is generally not employed today.

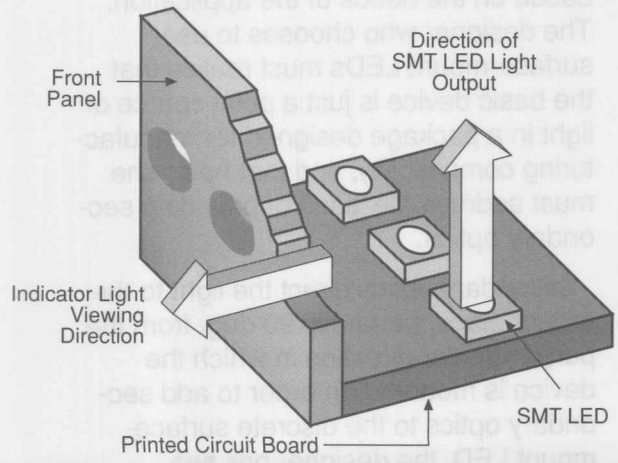


Figure 22

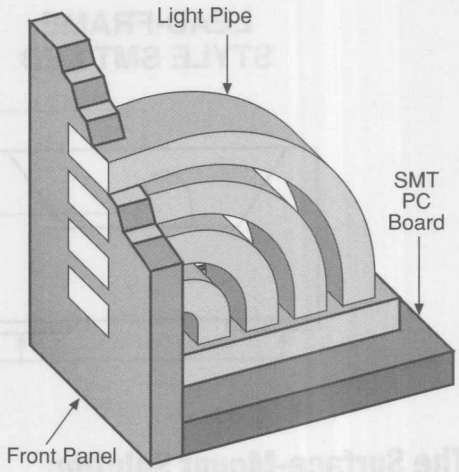


Figure 23

Current substrate and lead-frame type surface-mount LEDs were introduced in the mid 1980s to satisfy both the requirements of surface mounting and optical performance. However, LEDs alone do not address the need to direct light output from the circuit board to the front panel, which is a frequent requirement.

This need was addressed through development of a device called a *light pipe*, which acts as a conduit for the light, routing it from the LED to its intended viewing location (see Fig. 23). Light pipes are a viable solution in many situations, but add a manual manufacturing step (placement of the light pipe on the board).

It was not until Dialight introduced the Prism® CBI Series in 1992 that a process-survivable LED and a right-angle solution were combined in a single package. The Prism is fully compatible with the surface-mount process, including automatic pick-and-place equipment.

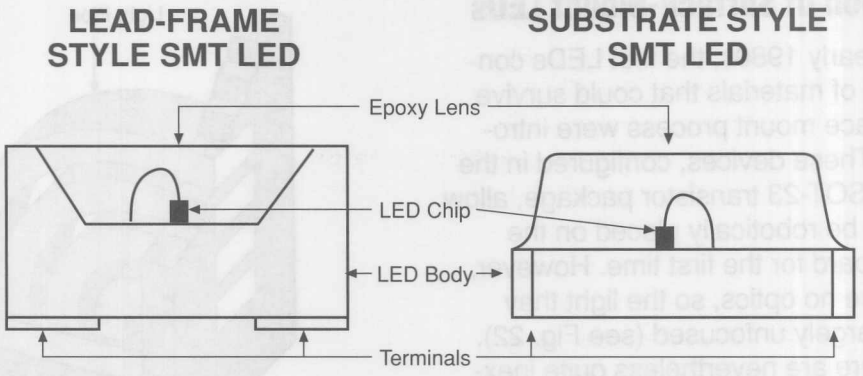


Figure 24

The Surface-Mount Solution

Two types of surface-mount LED construction are available to the designer: substrate and lead-frame (see Fig. 24), each one optimized to reduce the stress on the die as it goes through the infrared reflow soldering process.

The advantage of the substrate type is its compact size, which makes it well suited for low-cost, high-density applications. Although standard substrate-devices have traditionally had no optics, lenses are now being molded on the LED to provide some optical characteristics. Within the substrate category, there are two choices of material...ceramic and glass epoxy. Ceramic types are white, which reflects the light upward. They also withstand high temperatures and current. Their disadvantages include poor low-temperature performance below -20°C. Glass epoxy types are designed to withstand temperatures of -40°C, but they are the color of a printed circuit, and so do not reflect light as well as their ceramic counterparts. In either case, the LED die is bonded to terminals that are integrated or attached to the substrate.

In the lead-frame type, the lead frame is molded into a high-temperature plastic housing and the LED chip is bonded directly to the lead frame. This type has better optics because it allows for use of a reflector cup, which cannot be accommodated in the substrate type configuration. It is also more robust in construction. However, it is also larger.

Secondary Optics

Unlike their through-hole counterparts, which incorporate secondary optics such as a reflector, lens, and diffusant along with the die, surface-mount LEDs require these features to be added externally based on the needs of the application. The designer who chooses to use surface-mount LEDs must realize that the basic device is just a point source of light in a package designed for manufacturing compatibility, and that he or she must address the issue of providing secondary optics.

Secondary optics direct the light to the proper place, generally 90 deg. from the perpendicular direction in which the device is mounted. In order to add secondary optics to the discrete surface-mount LED, the designer has two alternatives.

The first method is to place discrete surface-mount LEDs on the board, and attach a component called a light pipe to the circuit board or front panel after the soldering process. The light pipe is a precision, molded plastic component that routes the light from the die to the intended viewing location at a right angle from the circuit board.

This approach has one primary disadvantage: it requires a post-process assembly step to place the light pipe on the circuit board. However, it has significant advantages as well:

- The designer has flexibility in selecting a shape and size LED
- There is good access to the surface-mount LED for rework and inspection
- LED alignment is less critical
- There is minimal interaction with the front panel, there is no burden on its design
- The viewing surface is changeable
- Backlighting and direct view applications can be accommodated

Light pipes are especially useful in applications requiring a horizontal or vertical array of LED indicators. With careful light pipe design, it is frequently possible to create a single molded part to redirect the light from multiple LEDs to multiple front-panel indicator positions without optical crosstalk between them. This can result in a low installed cost per indicator position.

The light pipe is a deceptively simple device. Since LEDs have a limited amount of light output, the light pipe must ensure that as much of this light as possible reaches the panel. This requires critical ray tracing to optimize the light pipe's optical transmission performance. In addition, the requirement for easy circuit-board mounting provides opportunities for light loss which must be addressed in the light pipe design.

Finally, molding techniques must be precise in order to minimize any impurities and air bubbles in the plastic along with inconsistencies inherent in the molding process. Through significant development efforts, Dialight now designs and manufactures light pipes that both accommodate the requirements of molding and deliver exceptional optical performance.

The Single-Component Solution

The second method of applying secondary optics is to employ a fully process-compatible component containing both an LED light source and optics. This solution does not require post-process insertion of additional components on the circuit board, and the entire

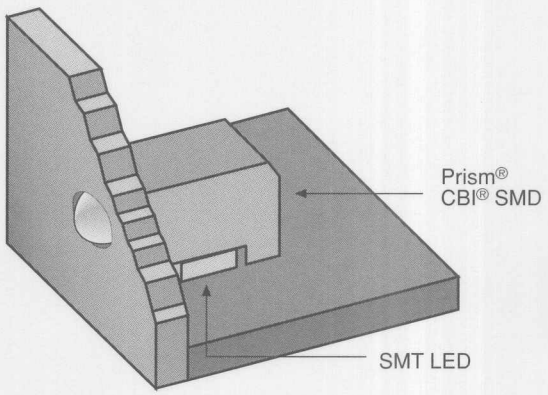


Figure 25

solution, including LED die, optics, and light pipe, can be placed on the board in a single assembly step. A good example of this approach is Dialight's Prism CBI Series (see Fig. 25), which incorporates a surface-mount LED and a prismatic right-angle lensing system in a single component. The Prism is fully compatible with the surface-mount process.

The disadvantages of this approach include a limitation on size and height, difficult in inspecting and device and reworking its attachment, and higher cost. However, in a growing number of applications, the Prism is the most cost-effective solution, especially when the complete installed cost of the device and secondary optics is considered.

Deciphering the Real Cost

From a cost standpoint, it sometimes appears less expensive to continue manufacturing mixed-technology circuit boards because the surface-mount component can be more expensive than its through-hole counterpart. However, the total installed cost can be less when using a surface-mount LED because it is much less labor-intensive to install and allows a higher density of components to be achieved on the board. In addition, the designer has the ability to use both sides of the board. Making the move to surface-mount also reduces by one the types of components that must still be through-hole mounted, speeding the conversion to all-surface-mount assembly.

Fortunately for the designer, there are an increasing number of LED indicator solutions available for surface-mounting. The only decision is to choose the proper one for a given design.

Glossary

Backlighting
Illumination by an indicator of a front panel legend from behind, without protrusion of the LED through the panel.

Bicolor LED
A component that contains two LED dice of different colors in a single substrate or lead-frame carrier. The components have either two, three (common cathode) or four lead wires for turning the devices on and off.

Bilevel CBI
Two LEDs stacked vertically in a single housing.

CBI
The trademarked name of Dialight's Circuit Board Indicator (CBI) Series of LED indicator solutions.

Candela (cd)
The standard unit measure of luminous intensity which is used to calculate lumen and foot candle measurements.

Continuous forward current
The current that must be applied to the p-side of an opto-electronic device -- such as, an LED to produce a given output.

Crosstalk (light bleed)
The undesired illumination of one indicator position by the light source from another.

Current-limiting resistor
A protective resistor added in-line between the power source and the light source to regulate current delivered to the device. The value of the resistor depends on the operating voltage of the circuit.

Diagnostic application
One of two applications served by circuit board indicators (the other being front panel applications). In diagnostic applications, the indicator is mounted on a circuit board, generally without secondary optics, and is viewed at close range by a service technician inside a piece of equipment.

Die
The basic semiconductor device or "chip" inside the LED assembly.

Diffusant
Glass particles suspended in the epoxy lens of an LED that diffuse the light and broaden the device's viewing angle.

Direct view
The application of an indicator in which its lens protrudes through the front panel and is viewed directly.

Dominant wavelength
The wavelength at which the human eye perceives light emitted from an LED to be strongest.

Electroluminescence
The nonthermal conversion of electrical energy into light. In an LED, it is produced by electron-hole recombination in the p-n junction.

Epoxy
A resin characterized by high adhesiveness, toughness, and corrosion resistance. Used to surround LED die to provide attributes -- such as, diffusion and lens shape.

Foot-candle
A unit for measuring illumination. One foot-candle equals the amount of light delivered by a 1-candela light source to a 1 sq. ft. surface 1 ft. away.

Foot Lambert
A unit of light measurement. 1 foot Lambert is equivalent to 3.4 cd/m^2.

Front panel application
The application of an LED in which the light is viewed at the front panel of the host equipment. This usually requires either backlighting or direct-view configuration.

Forward voltage
The voltage that must be applied to the p-side of an optoelectronic device -- such as, an LED to produce a given output.

Incandescence
Emission of light through thermal excitation resulting from the superheating of a conductor. The excitation must be sufficient to produce enough photons to make the light source visible.

Incandescent lamp
A light source based on incandescence in which voltage is passed through a filament that heats to create light.

Integral resistor
An LED design option in which the current-limiting resistor is contained within the package.

Infrared
The region of the electromagnetic spectrum between the long-wavelength extreme of the visible spectrum (700 nm) and the shortest microwave frequencies (1 mm). Nearly all of the infrared portion of the spectrum is invisible to the human eye. Infrared LEDs are used in sensing, data transmission, ambient light detection and other various applications.

Lead frame
A metal structure to which a semiconductor die is attached. The lead frame provides stability for the devices and completes the electrical path to the die.

Lens
The epoxy enclosure molded to an LED die to provide optical characteristics.

Light Emitting Diode (LED)
A p - n junction semiconductor device that emits incoherent, monochromatic optical radiation when biased in the forward direction.

Light pipe
An optical conduit made of molded plastic that directs the light from an LED to the viewing location, often at a right angle from the circuit board.

Lumen
A unit of luminous flux, equal to the luminous flux emitted by a standard point source having a luminous intensity of one candela.

Millicandela (mcd)
One thousandth of a candela.

Nanometer (nm)
One billionth of 1 meter. Often used (along with angstroms) to quantify the wavelength of light.

Neon lamp
A light source that generates a blue or amber light by exciting a neon gas plasma with heated electrodes.

Operating current
The current which a device -- such as, an LED is designed to draw from the power source.

Operating temperature
The range of temperature over which a device will safely operate.

Operating voltage
The voltage or range of voltages at which a device is designed to operate.

p-n junction
Holes and electrons combine in the negative (n) region of a positive-negative (p-n) junction semiconductor diode. During these shifts in energy, photons are generated, some of which are absorbed by the semiconductor material and some of which are emitted as light energy.

Power dissipation
The amount of power dissipated as heat by a device.

Prism
A device used to separate a light beam into its spectral components. In LEDs, the prism directs light output from an LED to the viewing location. Also the trade name for Dialight's patented through-process SMT LED indicator.

Quad-level CBI
Four LEDs stacked above each other in a single housing.

Reflector cup
A coined portion of a lead frame that forms a reflector around the periphery of an LED die, and directs its light output. The reflector cup is an integral part of the device, and is unique to the lead-frame type rather than substrate-type chip carrier.

Right-angle viewing
A type of indicator application in which the light output must be viewed at a right angle (i.e., in a direction parallel to the circuit board).

Reverse breakdown voltage
The reverse voltage applied to a diode, which, if exceed, will cause the device to fail. Specifically, the value when a diode is reversed biased, that avalanche breakdown occurs.

Secondary optics
Devices that are used to enhance or redirect the light output of an LED. Examples include lenses and light pipes.

Super-bright LED
An LED designed to produce exceptionally high light intensity.

SMD
Acronym for surface mount device.

SMT
Acronym for surface mount technology.

Surface-mount LED
LED designed to conform to the requirements of the surface mount circuit-board manufacturing environment. Surface mount devices must withstand the infrared soldering process, and must be physically compatible with automated pick-and-place equipment.

Through-hole LED
The most common type of LED package. It is connected to the circuit board via its leads that also serve as the interface to the power source. The through-hole LED is not surface mountable.

Tint
A color added to the epoxy lens of an LED to identify its color when on.

Transparent substrate
A characteristic of an LED die which increases its light output. The substrate on which the upper portion of the die is grown is a transparent semiconductor material that does not absorb the light energy.

Trilevel LED
Three LEDs stacked above each other, generally realized with light piping.

Tricolor LED
A component that contains two LED dice of different colors in a single substrate or lead-frame carrier. The components have either two, three (common cathode) or four leads for turning the devices on and off. This LED can also be called a bicolor LED.

Viewing angle
The area in front and to the sides of an LED at which light output falls off 50 percent. The viewable area appears as a cone-shaped pattern.

Visible spectrum
The light spectrum between 400 and 700 nm which is detectable by the human eye.

Water clear LED
An LED die combined with a clear lens that has no tinting is sometimes referred to as a water clear LED.